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MARCH/APRIL 1999

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Cover photo: Mechanical hedging of open lyre trellis at Chalk Hill Estate Vineyards & Winery. Photo by Don Neel

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15 Grande Paseo,
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www.practicalwinery.com

PUBLISHER
EDITOR
Don Neel

ASSOCIATE
PUBLISHER
Carol Caldwell-Ewart

PUBLISHER'S
ASSISTANT
Beverly Wright Woo

ART DIRECTOR
Diane Cobb

CONTRIBUTING
EDITORS
Susan Diane
Ken Fugelsang
Eleanor Heald
Ray Heald
Glenn McGourty
Ed Weber
Bruce Zoecklein

CONTRIBUTING
WRITERS
Millie Howie
Jake Lorenzo
George Schofield
Craig Root
Dr. Richard Smart
Dr. David Storm

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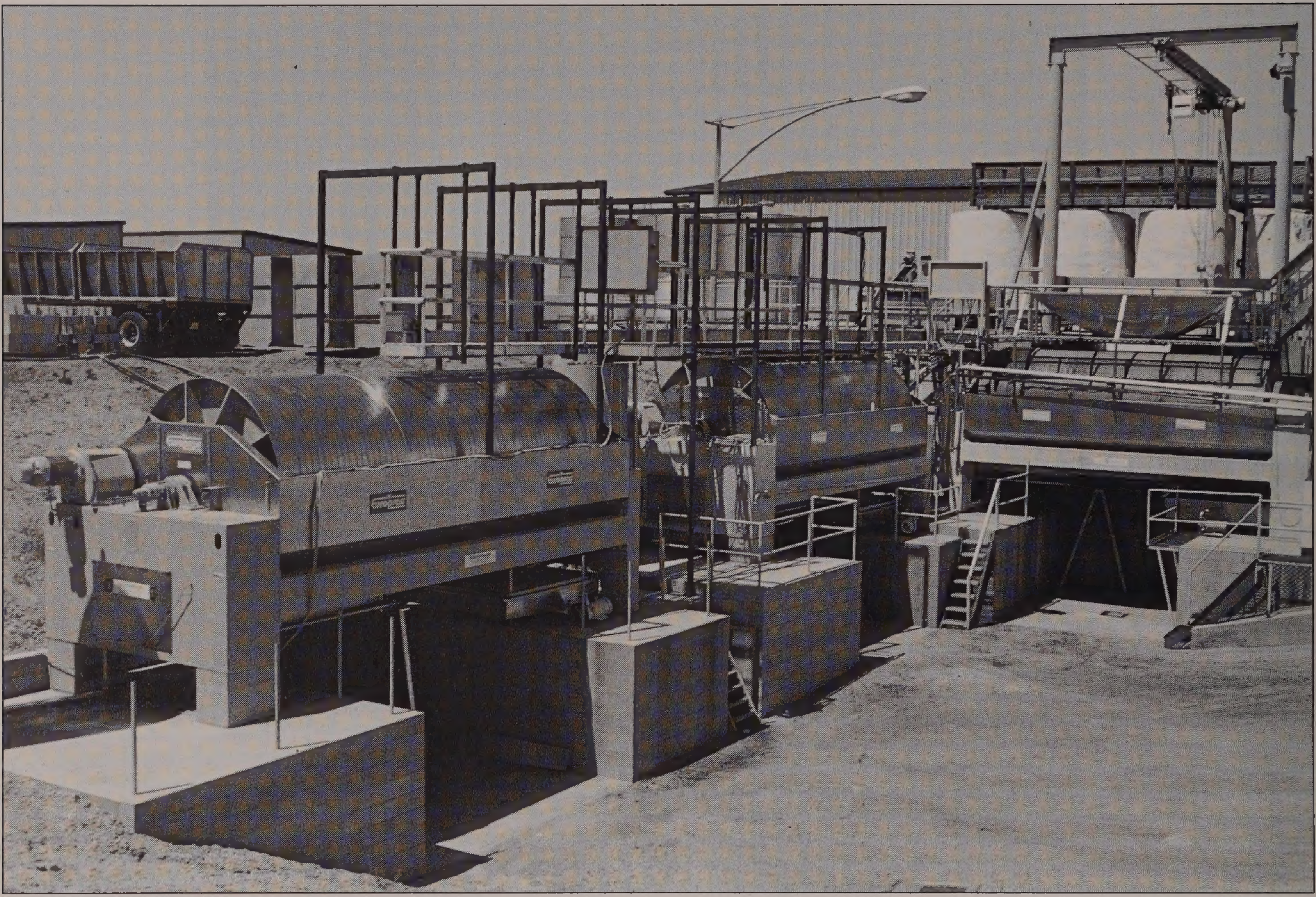

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WINE INDUSTRY ECONOMIC PITFALLS

PART VI

Unreasonable expectations

(The last in a six-part series on Pitfalls in the Wine Industry)

by George Schofield

The allure and promise of the wine (and grape) business are most attractive. An enjoyable product, romance, winning gold medals, the beauty of the locale, the prestige, and the hope for fortune are all parts of the enticement. Certainly all these are attainable. What are often overlooked are the odds of success and the work and dedication necessary to achieve it. Those who are not aware of the pitfalls in the wine industry are susceptible to disappointment and have unreasonable expectations about what they can accomplish.

Winemaking toil

On the surface, the romance of wine prevails. Buy some grapes, make the wine, watch it age, and see the wine sell itself. Simply enjoy the process and count the rewards. This image overlooks the requisite sacrifices and dedication. The crush often involves 16-hour work days, seven days a week for several weeks. Included may be the dubious pleasure of shoveling pomace out of a red fermentor. In addition, watching the wine age involves barrel work and constant vigilance.

Ironically, the challenges only increase once the wine is produced. Simply making good or even great wine is no guarantee for success. Indeed, many vintners find it is a lot easier to make good wine than to sell it.

Selling chores

Selling wine involves an entirely different set of talents and, perhaps, even a different personality. Standing as "gate keepers" between the winery and sometimes eclectic consumers are the perils of the industry's three-tier distribution system. Wholesalers and retailers are commercial businesspeople often with different priorities, values, and lifestyles. Nevertheless, winery management and owners must pursue and cultivate wholesalers' and retailers' interest and support. Moving up in their priority chain and staying there are key. This requires extensive effort, persistence, traveling, and some degree of humility.

Once the crush is over, rather than relaxing at home, winery owners and sales personnel frequently must begin a schedule of meetings in distant markets with wholesalers, retailers, and restaurateurs. Rather than a quiet weekend at home, the owner may have to fly off for special tastings and winemaker dinners with people he or she doesn't know well and doesn't necessarily want to be with. Flying off to Chicago in January for a special tasting and grand dinner may sound romantic and exciting, but such trips can be exhausting, hard work, and a real sacrifice of personal life.

Personal costs

The tremendous cost of running a vineyard/winery operation can not be measured merely in time and money. Often the personal sacrifices over numerous years cause family difficulties, divorces, and health risks. The hectic annual crush is normally only about 10 weeks. However, when compounded by other factors, from vineyard management (early morning frost alarms) to financial woes, the cumulative effects can be traumatic. It is so difficult to say no to a demanding trade that often the winery and wines become inordinately invasive into personal life.

Gaining favorable publicity

While it may be everything to the winery owner, the average winery may only be a relatively small part in a large wholesaler's portfolio. Similarly, its wines may only be one of many brands on a retailer's shelves or restaurant's wine list. To command attention throughout the distribution channel, a winery must create some favorable press and ratings. To gain such publicity, the winery generally has to be good, lucky, and pay its dues.

Care and feeding of the wine media are almost art forms. Gracious hospitality and entertainment are the highest requirement, which is the main reason most wineries have special facilities available for special guests. Competition is fierce in more ways than one, but the benefits are great.

One of the rewards is breaking the complete dependence on wholesalers and retailers. Small wineries, in particular, which lack the clout of volume, can rely on obtaining very little "push" for their products from standard distribution channels. Taking orders and filling empty shelves are a lot easier than creating selling strategies and finding new customers. However, when the winery can provide consumer demand through ratings and publicity, the whole sales process is facilitated exponentially throughout the system.

Brand loyalty

Many young wineries also have another unreasonable expectation — wine brand loyalty. The nature of the industry is such that each vintage is different and variations in quality and quantity should be expected. A corollary is that the relative quality differences between individual brands also change annually. As a result, consumer loyalty, which may be based on a specific high rating for an individual variety and vintage, is most often short-lived. Last year's hot brand may fall back into the "pack" this year. All the hard work must begin anew.

Consistency

One consolation is that consistency is very well-rewarded. Those wineries that can achieve broad quality recognition year in and year out gain an image that is better than pure brand loyalty. The eight "First Growths" of Bordeaux, in a classification occurring almost 150 years ago and seldom revised, are the supreme example of the prestige and pricing advantage that can be achieved.

Quality: Perception versus reality

Related to the consistency issue is the dual nature of quality. As indicated earlier, it is not sufficient to produce good or even great wines. Separate from the reality of quality is the market's perception of quality.

Many small wineries struggle with and often achieve a high standard of real wine quality. Unfortunately, without general recognition of this reality, difficulties arise in selling all the wine production, at least at prices corresponding to the wine quality, competition, or even the cost.

Shifts in image

Once a general "perception" of quality is established in the wine world, for better or worse, it usually takes a long time for the image to change. An example of this is the Beringer Brothers brand just prior to and after its acquisition by the Nestle Company nearly 30 years ago.

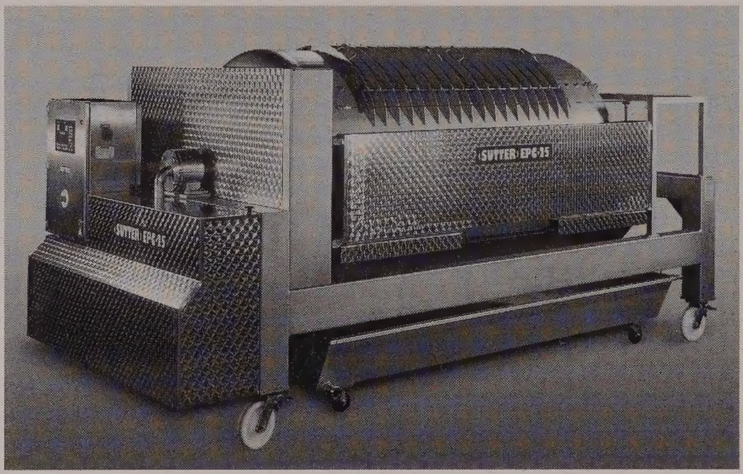
Beringer Brothers Winery at that time was experiencing financial difficulties, which seemed to affect the real wine quality. However, the long historic reputation of Beringer Brothers Winery as a producer of fine wines sustained the brand, and the awareness by the consuming public of this waning of wine quality lagged for several years. Eventually the reality did become general knowledge.

Then in the late 1970s and early 1980s, Nestle Company and the management of Beringer Brothers decided to restore luster to the brand. A major, extensive program to improve real quality was initiated. Grape sources, including owned vineyards, were compelled to raise quality standards. Winemaking procedures, personnel, and facilities were all reoriented toward higher quality standards.

Recovery

As real quality improved, perception of the change again lagged significantly. For many years Beringer Brothers wines, to those who knew, were remarkably good buys, as wine quality surpassed image (and relative pricing!). Today, after several years of excellent wine production, the reality and perception of Beringer Brothers wines are again close together at a very high level.

Although changing the current image of a brand is a long-term endeavor, the problems associated with upward positioning or resurrecting a brand are formidable. Before such an attempt is made, an early assessment as to whether the brand has been "mortally wounded" as a premium pricing vehicle is prudent. Regaining image may be a far more difficult dilemma than creating something new.



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Upward mobility

The E.& J. Gallo Winery, which for decades has consistently produced remarkably good wines at low prices, has struggled with a related problem. Gallo wines have been acclaimed as the best *vin ordinaire* in the world and as extraordinary values. However, the image garnered in the process, although a much deserved accolade, has also been a lingering legacy hampering Gallo's endeavor to develop a premium quality image associated with the production and sales of much higher-priced top varietal wines. Seemingly, regardless of the quality of its world-class fine wines, the image of Gallo as primarily a producer of inexpensive, generic wines prevails.

Recently the winery's approach of using a different name for premium wines, "Gallo Vineyards of Sonoma," has apparently helped. Nevertheless, it may take a generation of effort and dedication to elevate the image into one encompassing broad recognition of the reality of the high quality of Gallo's top varietal, vintage-dated wines from coastal regions. Surely, when a company as strong and resourceful as Gallo encounters such difficulty, others should be wary of the quagmire.

Transferring downward

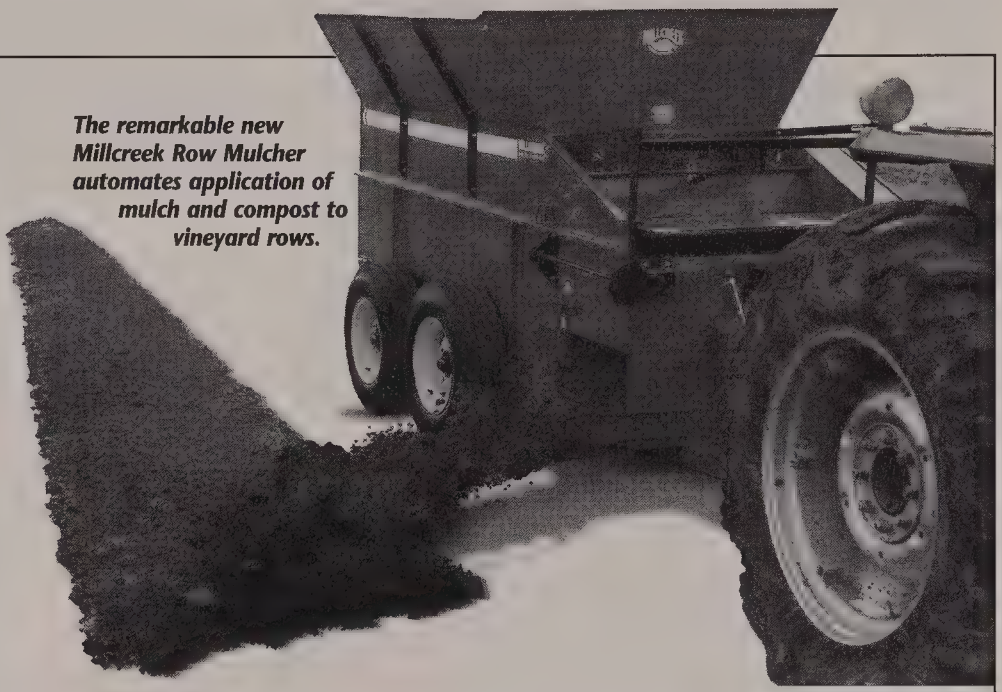
By comparison, the Robert Mondavi Winery has been remarkably successful in transferring the image it has created, as a producer of reserve-quality Napa Valley appellation wines and a co-producer of Opus One, to high-volume product lines of less expensive wines. This success includes not only being able to sell the other wines in significant high volume, but also being able to command a slight pricing premium in the market place. In addition to the direct benefits of achieving an image of higher quality production, the indirect advantage is the halo effect it has elsewhere in the winery's product line.

Inertia and gravity

Relatively speaking, it appears far easier to establish both the reality and perception of quality at high levels *initially* rather than to try to move upward subsequently. Initial image appears to exert considerable inertia. Moreover, if consistently validated by reality, at least in small volumes, the image/price advantage appears to be transferable to lower-priced wines from the same winery. On the other hand, to raise an established image significantly appears to be like fighting gravity in an environment like Jupiter. Although the desired end may be similar, the strategy for getting there may determine radically different results.

Unique nature

Those who enter the wine industry from other industries frequently do so with the misconception that the wine business will be similar. The integrated nature of the wine industry — from its fundamental agricultural base in the vineyard through its complex and elongated production/inventory ageing process and its archaic three-tier distri-



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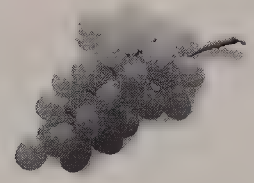

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bution system — provides a character to the wine business known in no other industry.

Over-regulation by federal, state, and even county governments at all levels of operation and activities also makes the wine industry atypical. Selling wines in the individual states of the U.S. can be like dealing with 50 foreign countries. As a result of the way Prohibition was repealed by the 21st Amendment to the U.S. Constitution, the laws of free interstate commerce do not apply to wine and other alcoholic beverages. A patchwork of state regulations, licenses, and taxes has arisen. Some states recently have gone so far as to make it a felony crime to ship wine directly into their state. So much for similarity to other businesses!

Conclusion

Managing a winery/vineyard entity presents a normal range of business challenges. Most of these are centered around the production, sales, and financial functions. In addition, the industry-specific issues — of coping with annual grape crop variations, the huge capital requirements (including long inventory cycles), and the sale of a consumer product which is very discretionary — provide a compounding effect on the challenges.

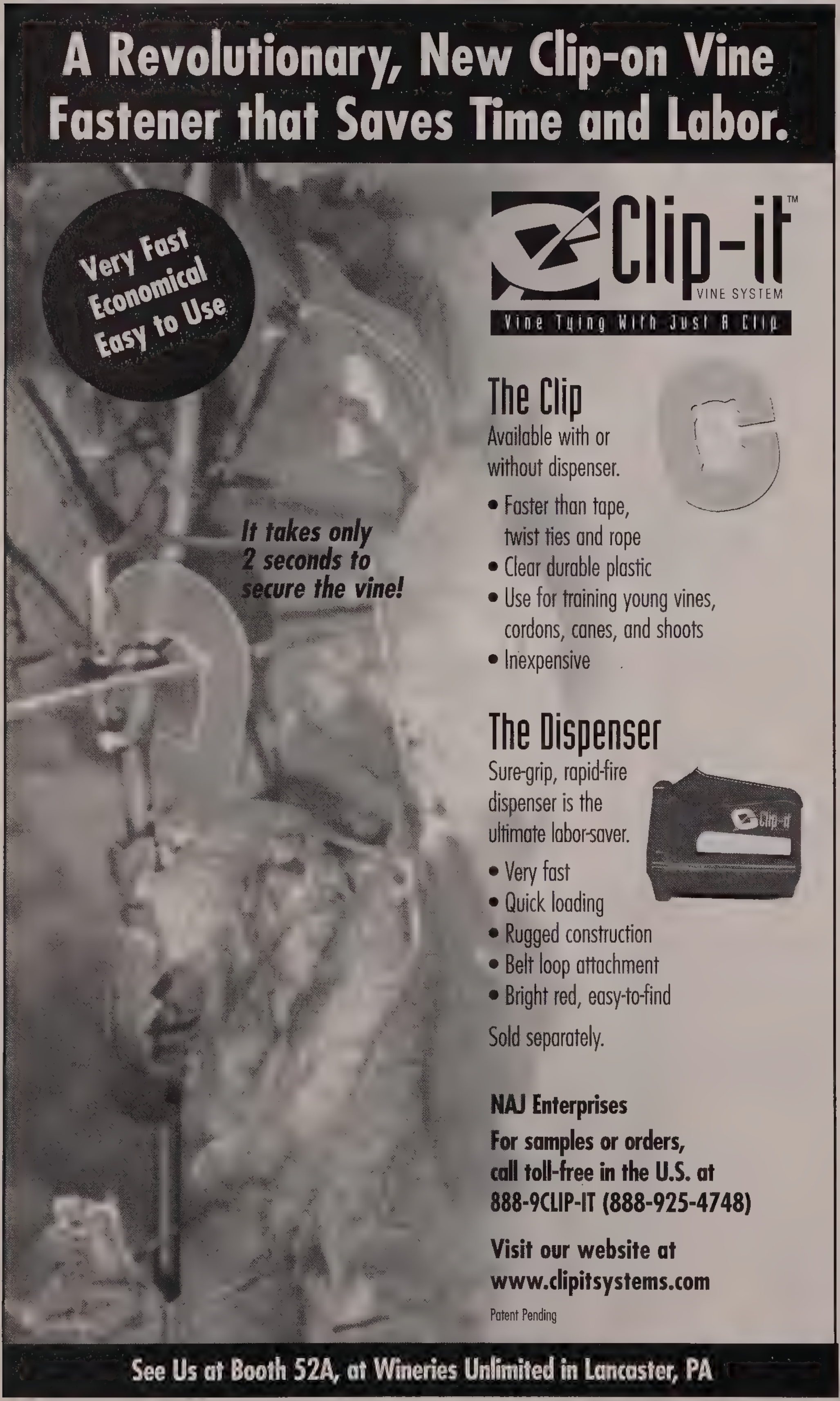
Although significant, the challenges are not insurmountable. The important thing is to make a realistic assessment of prospects, requirements, and likely results. Equally important is to avoid being discouraged, disconcerted, or disappointed. With awareness, commitment, and patience, success can be achieved.

To those willing to make the sacrifice, the wine business, in the long run, can be a rewarding and satisfying enterprise. The simple facts are that it takes six years for a vineyard to mature, another one to three or more years to age the better varietal wines properly, and at least 10 years to establish a brand. Those who endure and succeed can create a name for themselves, a large equity value, and in the process, associate themselves with a variety of fascinating people. Perhaps this last reward is the greatest.

Growers and vintners come from a diversity of backgrounds, and many have been very successful leaders in other fields first. Doctors, lawyers, educators, architects, and many others have joined the ranks. The collegiality and friendly competition within the industry can be a joy to experience.

The wine business with all its pitfalls and risks does provide a good, wholesome life style. Moreover, almost daily we are increasing our knowledge of the positive effects of moderate wine consumption on health.

Grapegrowing and winemaking can be traced back 4,000 years to the beginning of history. Wine itself is a product intimately involved with our culture, religion, science, and basic civilization since the beginning of recorded history and probably earlier. Perhaps the allure of being part of this tradition, of adding something to it, and passing it along to future generations explains why so many try so hard and risk so much. Thank heavens for those who have and continue to do so. ■



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EQUIPMENT/BARREL LEASING

A powerful tool for your financial toolbox

by Carol Caldwell-Ewart

Suppose that, just at the moment when you need expensive equipment for the vineyard or winery, someone buys the exact brand and model you need and agrees to let you use it for the next few years. All you have to do to use the equipment is pay a monthly fee — no down payment. And what if, after the agreed upon time expires, you can buy the equipment for the remaining value, return it, or continue to use it under new (less expensive) terms? Is this a deal you would go for?

Increasingly, vineyard and winery owners and managers are choosing to lease new or used equipment over purchasing — barrels, tractors, presses, bottling lines, and much more — in order to enjoy just these benefits. *PWV* discussed the ins and outs of leasing with several experts in wine industry leasing to provide the information you need to shop effectively for a lease.

What is a lease?

"A lease is nothing more than a long-term rental," says Mari Featherstone, partner in LeaseMark, Santa Rosa, CA. An independent lessor, LeaseMark handles the leasing portfolio for National Bank of the Redwoods, a Sonoma County-based regional bank. "The difference is that rentals are usually month to month and leases are for a minimum of 12 months."

"With a lease," adds Linda Comet Koretz, vice president and leasing specialist for BankAmerica Leasing and Capital Group in San Francisco, "the lessee trades off the benefits of ownership to the lessor for a lower cost over the term of the lease."

Typically a lease runs for 12 months to five years, though "winery equipment lends itself to longer-term financing," explains Koretz, because of its long life.

Leases have several variables, but the three basic variables are the term or length of the lease, the payment, and the buyout. The buyout (or purchase option) amounts to how much of the value of the equipment remains at the end of the lease. That's the amount you will have to pay if you want to buy the equipment, though you always have the option of returning it rather than buying it.

There are essentially two types of leases: the operating lease (also called a true lease or tax lease) and the capital lease (also called a finance lease), which is really a conditional sales agreement.

In an operating lease, explains Featherstone, "you agree to a specific payment for a specific time, and the buyout will either be fair market value or 10% based on the original cost of the equipment. Fair market value (FMV) is sometimes set at 15% or is truly the fair market value." How the lessor and lessee determine what the FMV is at the end of the lease is one of the lease variables.

In a capital lease, she says, "you agree to a specific payment for a specific time and agree to purchase the equipment at the end. Under the terms of a capital lease, you will pay essentially the full value of the equipment over the lease period, and you're given the option of buying the equipment for $1 at the end of the lease. This is called a dollar buyout option. A capital lease is a conditional sales agreement and really more like a loan."

"The federal government sees a capital lease as financing for tax purposes and not as a true lease," adds Bill Volpa, vineyard and winery specialist with Comlease USA in Fresno, CA.

What are the benefits of leasing?

Leasing offers several benefits. One of the most important for many lessors is 100% financing, requiring no capital investment. "Often producers who need to add equipment would rather spend available capital for more profitable purposes," points out Paul Lamothe, regional sales manager for Farm Credit Leasing in Sacramento. His company is the leasing division of the Farm Credit System. Leasing requires a much lower initial cash outlay than purchasing with a loan, which may demand a down payment of 20% or more.

"Leasing is a way to manage your cash," says Jim Taylor, leasing agent with Hansel Leasing in Santa Rosa, CA. "Payments can be timed to coincide with your cash availability, and they may be monthly, quarterly, semi-annually, or at customized intervals," adds Lamothe.

Leasing also offers tax benefits, but the leasing experts are quick to insist that before you lease, you should check with your accountant. An accountant will help you determine which type of lease will give you the best tax advantage and whether leasing would give you any advantage at all.

In general, says Lamothe, "True lease payments may be 100% tax deductible. Therefore producers who have a tax liability can use leasing to obtain larger deductions each year of the lease." Though payments for capital leases are not tax deductible, with these leases you still get the same depreciation and interest-expense deductions on your taxes that you would have gotten if you had obtained a loan on the equipment, meanwhile, you're enjoying the benefit of 100% financing. In addition, if you decide to buy the equipment at the end of the lease, you then get to depreciate it again as purchased used equipment.

Lease payments are generally lower than loan payments for purchased equipment. "Lease payments cover only the depleted value of the equipment, not the full acquisition cost," explains Lamothe. "And the future purchase value is guaranteed, because it must be stated in the lease," adds Taylor. Since the buyout price is set in advance, the lessee benefits because the price does not reflect the economic inflation that occurs during the life of the lease.

"Leasing doesn't tie up your credit lines," says Featherstone. Taking out a loan to buy equipment eats into your available credit.

Will you qualify?

Leasing particularly appeals to start-up businesses that don't have the cash for a down payment and may have already borrowed up to the limit. Such wineries or vineyard companies may well still qualify to lease, however, they will be likely to pay more for it. As in all lending transactions, credit worthiness is the surest way to qualify for a lease, and companies that can demonstrate a good credit history and profitability may save as much as two to three percentage points on their lease.

BankAmerica "needs to see that we have a credit-worthy borrower," says Koretz. The minimum lease her department will handle is $50,000; there is no maximum. To qualify for a lease of any amount, the lessee will have to provide three years of operating statements, sometimes backed up by tax returns. "Typically, we don't lend to a start up without additional collateral support."

At Comlease USA, Volpa says, "For a small transaction $2,000 to $75,000, we only need an application, including the winery's bonded status and credit history. But for larger transactions we need a full financial package. Everything boils down to credit worthiness and the ability to pay back debt."

Reading the fine print

When you're negotiating a lease, there are several issues to be sure you understand and accept before you sign.

Leasing at Duckhorn Vineyards

"We want to put all our cash into land and vineyards," declares David Duckhorn, "that's what keeps our company alive." Chief financial officer at Duckhorn Vineyards, St. Helena, CA, Duckhorn says his company ascribes to the maxim recommending "Buy any asset that appreciates and lease any asset that depreciates."

"We do not consider leasing for our vineyards, because we are strong believers in the estate concept, and that the ultimate protection of the business and the brands is owning and protecting our sources of grapes."

Duckhorn produces just under 50,000 cases of wine annually and has five brands, 10 vineyards, and three winery estates, two in Napa Valley near St. Helena and Yountville, and one in Anderson Valley in Mendocino County.

"In any leasing decision, you have to begin with the economic situation of the winery," Duckhorn explains. "We have a profitable company, and so all our leases are capital leases that are more like a loan. If a company has taxable income, it is almost always more beneficial to have a capital lease, where you keep the ownership of the equipment and capture the interest and depreciation for tax purposes, than an operating lease, where you only get to deduct the lease payment. With an operating lease, generally your tax bill ends up larger.

"We have found that leasing structures have a lower cost of borrowing than equipment loans. In the early years, when we were cash starved, leasing provided a number of benefits, especially 100% financing. In general, a bank loan requires an equity portion of 20% to 40%. On a $100,000 piece of equipment, that $20,000 to $40,000 could go a long way toward barrels or other purchases.

"Leases generally provide for a balloon payment (buyout or residual) at the end that you can refinance, so the lease preserves your cash in the form of lower payments. With a loan, you pay the whole thing over the term. With a lease with a balloon payment, you save up front when you have no down payment, and you save over the term where you don't have to pay down all of the principal.

"When a lease runs out on a piece of equipment, we try to refinance it, which means, once again, we don't have to tie up our cash in the equipment.

"Our best use of leasing was for a bottling truck. Because we have three wine estates, we didn't want to have three bottling lines, so through leasing we have created a bottling line in a truck that can move to the different wineries rather than moving the wine.

"We could have hired a mobile bottling firm, but you have to book with them six months in advance, and we want to control our own destiny. The $600,000 trailer is nearly complete, and the first bottling run is scheduled for March 15. It has an Italian filler/corker, a Canadian pressure-sensitive labeling machine, and an American foiler. BankAmerica has been very efficient in handling the lease package. It's taken six months from concept to reality. The bank issues a check to buy the equipment as soon as we give them confirmation it has arrived. That's a management benefit that's good, too. Leasing is very efficient."

Not every lease has worked out well for Duckhorn. "We do not lease barrels," Duckhorn states definitively. He explains: "Small premium wineries are driven by quality decisions that affect the use of certain assets. Leases have specific terms with respect to time; wine in a barrel is subject to its own development with little regard to financing decisions. Once, for quality reasons, we felt the wine needed to come out of the barrel five months before the end of the lease. We had the barrels sitting around with no wine in them, and they were in the way. A larger operation would have been able to work them in somewhere, but not us.

"In another instance, we wanted to keep the wine in barrel six months longer, but could only increase our lease in 12-month increments. It is onerous to get out of a lease. It would have been more expensive to break the lease than to keep the extended lease for 12 months."

Like industry experts, Duckhorn urges would-be lessees to be sure they understand the lease they're signing, particularly the return provisions. In many leases, if the lessee chooses to give up the equipment, there's a provision for the lessee to be responsible for all shipping costs to the location of the lessor's choice. That is, when the leasing agent sells the equipment anywhere in the country, the lessee could end up paying substantial shipping costs to get the equipment from California to Texas, for example. "This is a negotiable point, and we set limits of within 100 miles of our principle winery or of a dollar amount," he says.

"Leasing has its place in any winery's total financing," Duckhorn believes. "Start with basic questions of profitability — which dictate the type of lease you move into — and tailor the lease to fit your needs. ■

"Sometimes people are surprised at the end of the lease because they didn't understand what the terms meant," cautions Featherstone. Take the usual care when signing any contract to insure that all the terms are spelled out as you agreed to them.

- **Costs:** "Up-front costs usually include document processing fees, which are typically $100 to $500 depending on the cost of the equipment and the amount of paperwork," explains Featherstone. These costs include processing fees, title search, the cost of filing a lien against the equipment, and sometimes an application fee. In addition, most leases require an initial outlay of first and last month's payment or first month and a deposit (which is equivalent to one month's payment).

"Make sure that what you're signing is the actual cost of the equipment. You've negotiated the price, and you need to be sure it's reflected in the lease," Volpa suggests.

- **Disposition and purchase option fees:** "Vehicle leases have purchase option fees — an additional fee to exercise the option to buy at the end of the lease. These vary from lease to lease," advises Taylor. "Most lease companies have a disposition fee at the end of the lease, which they charge to dispose of the vehicle if you don't buy it."

- **Fair market value buyouts:** Many leases place the cost of the buyout (purchase price at the end of the lease) at fair market value (FMV), but how that value is determined can vary markedly from lease to lease. "FMV is the equivalent of a retail price between a willing buyer and a willing seller," explains Koretz. It can be determined by consulting printed valuation guides, by an appraiser, or by consulting used equipment dealers, for example. Some leases allow lessees to bring in their own appraisals. Most leases set either a cap or floor on the purchase amount.

"I like to cap the FMV at not to exceed 20%," says Volpa. "Some equipment, such as tanks, will still be worth a significant percentage of what they were bought for at the end of the lease. Without a cap, the lessee would have to pay what they're worth, which may still be 50% of the purchase price. Except for barrels and hoses, winery equipment lasts for many years, so I try to make sure my customers know exactly what's

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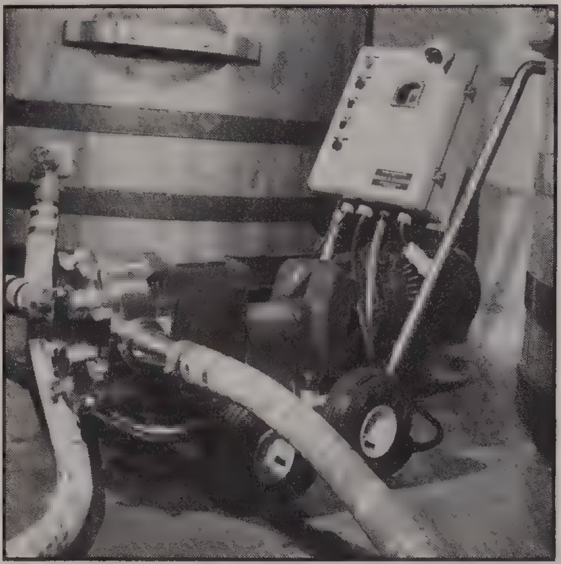

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going to happen at the end, and I write my leases to protect them."

- **Insurance, maintenance, and mileage:** As the holder of the equipment, you'll be expected to protect the value of the lessor's property with insurance and appropriate maintenance. The lease will provide for what penalties you'll pay if you do not. Be sure you understand what returned condition is expected on the equipment. "On a vehicle lease, be sure you know what the excess mileage charge will be if you go over the agreed mileage," recommends Taylor.
- **Prepayment penalties:** "Lessors have costs that have to be recovered," points out Koretz, so there will be a cost if you terminate the lease early. In some cases, prepayment may not even be an option. You'll also want to understand how the residual value would be factored into any prepayment calculation.
- **Residual or buyout options:** "Have a good understanding of how the residual is handled at the end of the lease," urges Lamothe. "We have a terminal rental adjustment clause, commonly used with leasing vehicles. When the payments have all been made, and the vehicle is returned, if we sell the equipment for less than the agreed-upon residual, the customer has to pay the difference. Of course, if the equipment sells for more than the residual, the customer *gets* the difference."
- **Restrictions on use:** Be aware that there will be limits on what you can do with the equipment once you have it. You can't cannibalize it for parts, for example, and the lessor may not let you move it. "For a true tax lease, the lessee can't move the equipment out of the country without affecting the lessor's tax benefits," says Koretz. In addition, the lessor wants to know where the equipment is at all times for property (tax) management.
- **Tax indemnification:** "The lessee could be responsible for indemnifying the lessor against legislated changes that affect the lessor's tax benefits," notes Koretz. That means changes in the tax code (such as the tax rate or amount of deduction possible) may affect your lease payment.
- **Term:** Be sure that the term on the lease agrees with what you think you're buying, and be aware that some lessors require you to contact them to renegotiate the lease when the term is up. If you

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keep paying beyond the lease term, you may automatically re-up for another year at the same rate.

Flexible payment schedules

Though most lessees opt to make their lease payments on the traditional monthly basis, the wine industry is such a cyclical business that the potential flexibility of lease payment schedules can be particularly appealing. Not all lessors offer all options, but lessees can elect to have step leases, where, for example, the payment on a four-year lease is at one level for the first two years and then goes up or down for the next two years.

"If you have more cash in summer and less in winter," suggests Featherstone, "you might have a payment that is half in winter and doubles in summer." Some lessees pay in advance once, twice, or four times a year. "There is extra work involved in billing differently," she admits, "so these leases may cost a little more."

What kind of equipment can be leased?

"Farm Credit Leasing will lease virtually any type of equipment used in agriculture with the exception of airplanes and hazardous waste containers," declares Lamothe. The other experts agree that nearly any kind of equipment can be leased (including airplanes). In the wine industry, people most often lease trucks, tractors, gondolas, office equipment, tanks, bottling lines, and barrels. Farm Credit reports that its leases break down into the following categories: 7% transportation; 36% plant/processing equipment; and 57% field equipment.

Leasing companies are also quite open to leasing used and custom-built equipment. Taylor says Hansel requires a third party appraisal on used equipment, so his company and the lessee can be assured that the value of the equipment is sound.

Even if a winery or vineyard owner has already bought a piece of equipment and is regretting not having leased it, it can be leased. Lessors will often buy equipment from you and then lease it back to you.

Lessors do have some special concerns with leases on custom-built equipment. They have to consider whether the equipment will have any value to other

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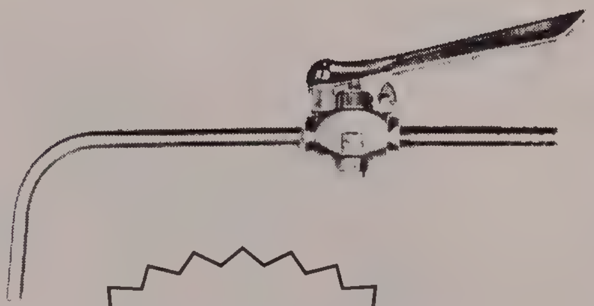

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buyers at the end of the lease, and if the equipment was built into the facility to the extent that it couldn't be moved if it had to be repossessed. In either case, strong credit-worthiness on the part of the lessee can usually overcome these concerns.

Though nearly anything can be leased, the lease terms available will vary widely with the type of equipment and how long it retains its value. Barrels, for example, have a short life span for ageing purposes. "Wineries use barrels differently, so how the winery uses the barrels and how they rotate them will affect the term and residual," explains Taylor. "Typically, we lease barrels for three years with a $1 residual. But some wineries use barrels for storage, for example, and that may affect what type of lease we're willing to do. We can tailor the lease to how they do business."

Even more than barrels, computer equipment quickly becomes obsolete. As a result, lessors generally configure their leases to get the value of the equipment during the term of the lease. "A key component of our pricing is the expected value of the asset at the end of the lease," explains Koretz, "if there isn't likely to be much residual value, then the running rate of the lease will be higher to the lessee than the running rate for assets that retain value over the lease term."

What about other costs?

Loans for purchase often include associated costs (called soft costs), such as installation, shipping, taxes, and computer software, for example. A few companies say they rarely will include these costs in a lease, but Koretz believes that it's part of the cost of doing business. "We include soft costs, typically up to 20% of the total equipment line. It doesn't enhance the residual, but customers want these costs covered, and we tend to finance them." Other companies cover soft costs up to 10% or 15% of the total.

Lease lines of credit

Not all companies do lease lines of credit, but they can be of great advantage to the lessee. "A lessee can pre-qualify for a certain amount," explains Volpa, "and they draw down against that credit as their equipment is delivered. These are usually good for about a year, though we may need to recheck financials at six months." The advantage is that you know the rate and don't have to make several applications.

Lamothe cites a mobile bottling line that Farm Credit is funding as an example. "Several vendors are working with the winery to supply the equipment to be used. We provide interim funding as the deliveries are being made, and the customer has agreed to pay interest on the advances. We make payments to the various vendors when our customer gives us a written OK with the invoice attached. It's essentially a construction loan with interest accruing until the unit is done. When it's done, we will bill the customer for the interest, and the first lease payment is due."

BankAmerica does equipment lines often. Koretz points out that specifics of financing packages are approved for up

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Is leasing for you? Ask your accountant

Experts agree unanimously that you must see how leasing fits in your company's financial picture before you will know whether it is a good choice for your winery or vineyard operation. "If you're considering leasing, talk with your accountant to determine if it's right for you," urges Taylor.

"Frequently vineyard and winery owners bring their accountants with them to discuss the lease," says Koretz, "and if not we sometimes ask if they want us to talk to their accountant."

The big picture

Leasing is increasing in the wine industry, though the experts agree that there's an ebb in leasing when cash is abundant and a flow when cash is tight. Still, the USDA reports that only about 20% of all agricultural producers in the U.S. lease, though about 40% of larger agribusinesses and cooperatives lease. Farm Credit Leasing reports that it has seen a 750% increase in lease placements in four years, in part due to the company's increased interest in providing leases.

"While leasing is growing dramatically in popularity with the more sophisticated producer," says Lamothe, "I still find that often vineyard and winery owners are not familiar with or understanding the lease product. Their acceptance of leasing changes once they become more informed about this alternative financing tool."

Featherstone agrees: "People in general are not taking advantage of leasing because of a lack of understanding and a sense of mistrust. Oftentimes, people have had poor experiences and don't want to try again." In the past, experts say, when the leasing industry was relatively new, some lessors pushed too hard to sell leases and not hard enough to educate consumers. As leasing has matured, lessors have recognized that they benefit most by helping customers find the financing vehicle that works best for them.

Leasing has also been affected by wine industry trends. "During the past five to seven years," Koretz recalls, "there has been a strong interest in developing new vineyards, and wine industry capital has been going in that direction. As those vineyards mature, there is a greater focus on providing the financing for the new winery production equipment that is required to handle the increased grape production."

Ray Garassino, treasurer at Robert Mondavi, Oakville, CA, says the company uses leasing as one of its financial tools. "Look to lease financing as one of the alternatives of meeting your business's financial needs. And understand the terms of a lease before you enter into it. It could be a great deal or a lousy deal." ■

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A MODERN VIEW OF VINEYARD LEASES

Conquering fear and boredom

by Dick Lemon
Dickenson, Peatman & Fogarty
Napa, CA

An ancient structure for the use and sharing of property, leasing is now the most flexible way for owners of vineyards and wineries to share risks, rewards, and land uses. The common practice of leasing agricultural land was even addressed in the Bible.

For example, in *Leviticus* 25:8, a maximum 49-year lease term was imposed, and short term leases were a popular way to avoid the requirement that land lie fallow every seven years (*Exodus* 23:40). By the Middle Ages, tenancies in land had become the norm and resulted in full development and use of agricultural properties.

Agricultural leasing continued into modern times with more or less the same concepts and legal principles. A quiet revolution occurred in the late 20th century, however, at least in the wine industry. Until then, the landowner had the capital and power, and the tenant's goal was more or less to make a living wage by working the land. Today it is common to find a landlord seeking a well-capitalized tenant to develop or replant the family property. Tenants are often the ones with capital and power.

Adding to this shift is the fact that tenants in the wine business may be publicly held or otherwise tested by the public market's principles of return on equity and return on assets, which reward greater cash flow from fewer assets. The ancient lease has developed into a modern legal container for whatever mix a property owner and a property user might concoct in order to share between them the property and its rewards and risks.

Fear and boredom

With such a rich history, why do eyes still glaze over at the mention of "lease"? Why do people think of printed forms bought at a stationery store or, even worse, the gruesomely entangled boiler plate developed in secret ceremonies by generations of lawyers. The problem is that leases both bore and frighten CFOs, CEOs, and property owners.

The boredom comes from the long encrusted historical use of leases. Paradoxically, the fear comes from the fact that leases have now broken apart into very creative, custom-built structures that include economic, tax, liability, and control advantages for each of the parties. As a result, we fear that only really bright, cutting-edge people in tall buildings understand them.

The boredom and fear are both misplaced. A post-modern lease is whatever you want it to be, and it can apply to any property — equipment, barrels, names, and cash flow streams. Here, though, we'll focus on vineyard properties and the flexibility available to a vineyard landowner and tenant entering into a lease.

The vineyard lease

There is no such thing as a standard lease; a negotiated lease can deal flexibly with each of the major elements of a vineyard lease. If you as tenant or landlord carefully develop your short- and long-term goals with respect to a piece of property, the lease as a legal vehicle will accommodate you. The following variations are all real and have been used in leases I have prepared.

Nature of rent

The rent payable by the tenant can take many forms. It could be a flat dollar amount based upon a percentage of the land's value, thereby giving the landowner a guaranteed certain return. It would be as if the land's capital had been placed in a fixed-rate security but with the underlying capital appreciating or depreciating with land values over the term of the lease. Therefore, the landowner's return is the combination of current cash flow from the tenant and the underlying appreciation of the property. In this scenario, the tenant takes all the risk and enjoys all the rewards of the farming venture.

At the other extreme, there may be no guaranteed rent; instead the rent could equal the entire net crop proceeds each year less a negotiated compensation or return to the tenant, moving the risk and potential reward to the landowner's end of the scale.

Farming Risk — The landowner could take no farming risk (by having no rent determined by the production of the vineyard) or take all the farming risk (by having the rent based entirely on production). Typically, the landowner takes some farming risk (by having a base rent plus a percentage of the gross revenues of the crop).

Invested Capital — All development and replanting capital could be provided by the tenant with no guarantee of any return of that capital (naturally requiring a longer [typically 25 or 30 years] lease to justify the investment). At the other extreme, the landowner

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could contribute all capital needed to develop or replant the vineyard (with the rent and probably the term of the lease affected appropriately). Between these two extremes, the tenant may receive some credit on the rent for capital invested in assets that have a useful life beyond the term of the lease.

Tying up the land

No issue better shows how outdated thinking about leases can be than landlords avoiding leases because they fear losing use of their land for a long time. Besides the obvious fact that a lease term can be as short as can be negotiated (I have seen vineyard development leases as short as nine years), leases can be designed to accommodate the needs and assuage fears of both parties.

For example, an early termination of the lease by the landlord is very possible so long as the tenant receives a fair termination payment based upon his/her investment and realistic expected cash flows. The right to terminate the lease could relate to only a small portion of the property (so the landowner's family can retrieve some vineyard for a family wine business or to hedge the market). The lease could provide for certain tonnage of grapes to be retained by the landowner (in effect tempering the impact of the lease with a traditional sharecropping arrangement).

Value of land affected by lease

Landlords also may fear that the property's value will be hurt by the lease. It is true that long-term leases with fixed cash rent (as were common in the wine industry in the early 1970s) could have a major impact on the market value of the property, especially in the early and middle years of the lease. That impact may be positive (if the rent over time represents a higher return than the current market) rather than negative, but at a minimum, it creates some uncertainty.

However, a lease can be structured to have minimal effect on market value. For example, the rent can adjust periodically to true market rent by applying then prevailing capitalization rates to the then market value of the land (thereby eliminating a discrepancy between the lease rent and market rent). The lease could also provide for a termination of the lease if the landlord

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is selling to a buyer who wants to use the property (through a negotiated termination payment referred to above). In fact, the lease itself can add value to the land if, for example, it requires that the tenant use a vineyard designation for grapes obtained from the leased property (subject to the landowner being satisfied with that wine or with the winery).

Lack of control

Although it is not unusual now to see a tenant with more capital and experience than the landlord, nevertheless the lease can provide substantial or even complete control to the landlord over what happens on the property. Requiring a pre-approved development and replanting plan is reasonable, for example. Leases can specify landlord control over the varieties planted, spacings, farming practices, and later renewal replantings.

Change of tenant

The lease could give the landowner a right to terminate the lease if ownership or even management of the tenant changes, or at the other extreme, the lease may provide no control to the landowner (on the theory that so long as the tenant — any tenant — performs the terms and provisions of the lease, the landowner should be satisfied).

Financings

The lease could provide that the landowner assists the tenant in obtaining financing by permitting the tenant's lender's deed of trust to encumber the fee title (through a "subordination"), in effect adding the land's equity to the tenant's borrowing base. However it could do the opposite and provide that the tenant, through a guaranteed rent stream, gives the landowner a firmer borrowing base for the landowner's own financings.

These lease issues demonstrate that the lease structure presents no obstacle to either landlord or tenant in knitting together a successful relationship. The wine business shows in a dramatic fashion (through the diversity of wine styles, marketing and sales methods, financing, employment practices, etc.) that there are many individual paths to success.

The wide range of strategic appetites, interests, goals, and fears of the players in the wine business (small families, multi-national corporations, ambitious wineries, cautious wineries, and so forth) mean that excellent matches can be made between property owners and would-be property users. The lease is how that match gets made. By dropping outmoded concepts of leases, by being clear about what particular issues are important, and by customizing the lease provisions, both property owner and tenant can win. ■

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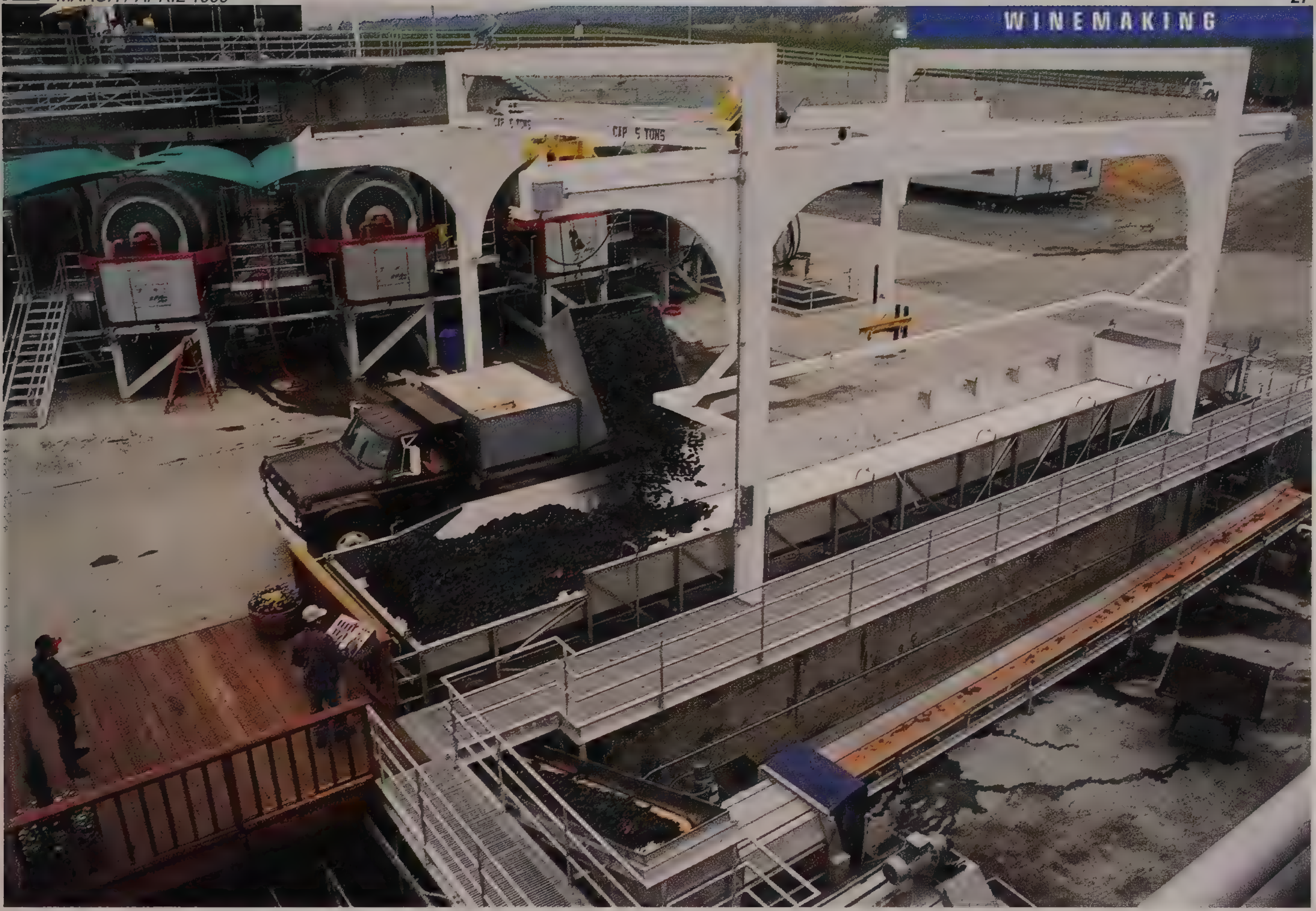

Photo by Don Neel

Receiving pits can accept a full (20 ton+) grape truck load in about 15 minutes without the truck having to move.

Gallo of Sonoma reduces red grape maceration

by Susan Diane

Winery design staff at Gallo of Sonoma (Healdsburg, CA) had a very specific objective in 1998: decreasing undesirable maceration of red grapes to improve premium-quality wine production. From the perspective of engineering, production, and winemaking, they studied fruit handling from the receiving pits to the red fermentors and were able to realize improvements in every step.

Simply put, this task demanded that they eliminate potential damage to grapes caused by processing equipment, while at the same time maintaining high speed handling of large volumes of fruit.

Such an assignment was not new to Gallo engineers. In 1997, they improved the efficiency of the winery's white grape whole-cluster pressing by installing 24 tank presses, which can receive up to 200 tons of grapes per hour. This system often runs 10 hours per day, six days a week during peak harvest periods and processes approximately 15,000 tons of grapes with virtually no back up of grape delivery at the receiving pits.

"Our winemaking team gives us a post-crush report each year," says George DePonte, construction project manager. "We all try to identify potential causes for macerated fruit. Then, we either change to better equipment or we design a solution from scratch."

In 1998, movement of red grapes, must, pomace, and wine was examined to identify areas of non-gentle treatment. The first improvement was achieved with construction of receiving pits that are much larger than most. The two new receiving pits are 30 feet long, 8.5 feet wide, and four feet deep. Each pit is served by a pair of separate movable hoists. A full truck stops at one receiving pit and is unloaded in about 15 minutes without moving, increasing efficiency of the flow of grapes and vehicle traffic. Growers appreciate the fast turnaround at the winery.

New belt conveyors

A flat belt conveyor (nine feet wide by 62 feet long) in each receiving pit delivers grapes to an incline variable-speed belt conveyor that feeds two destemmers in tandem. The belts are made from food-grade nitrile material. Previously, grapes were pushed from the pits by

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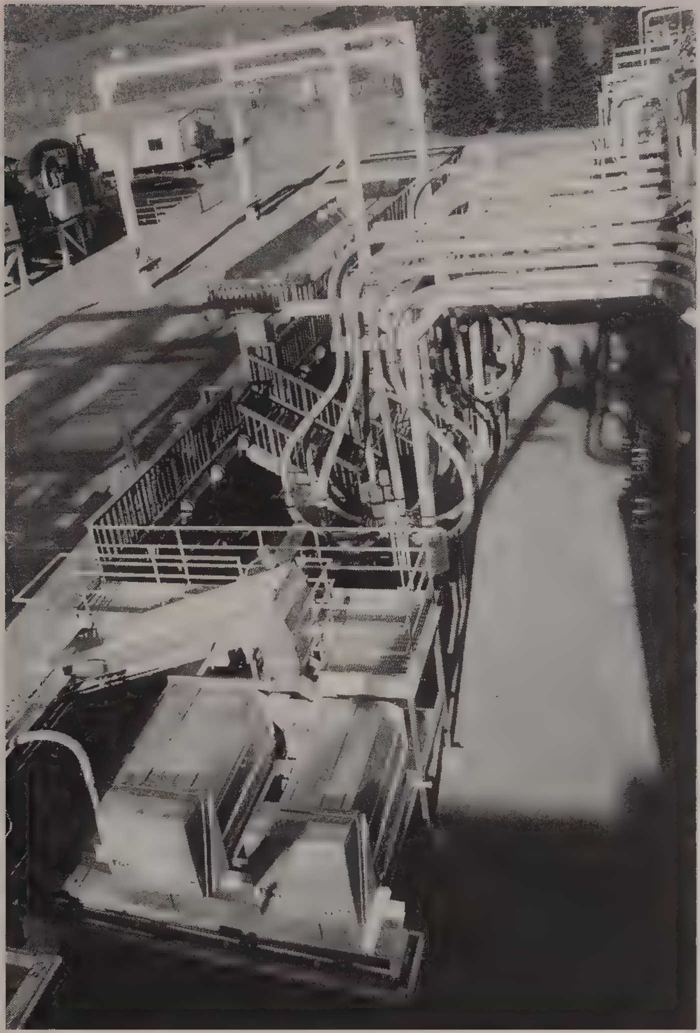
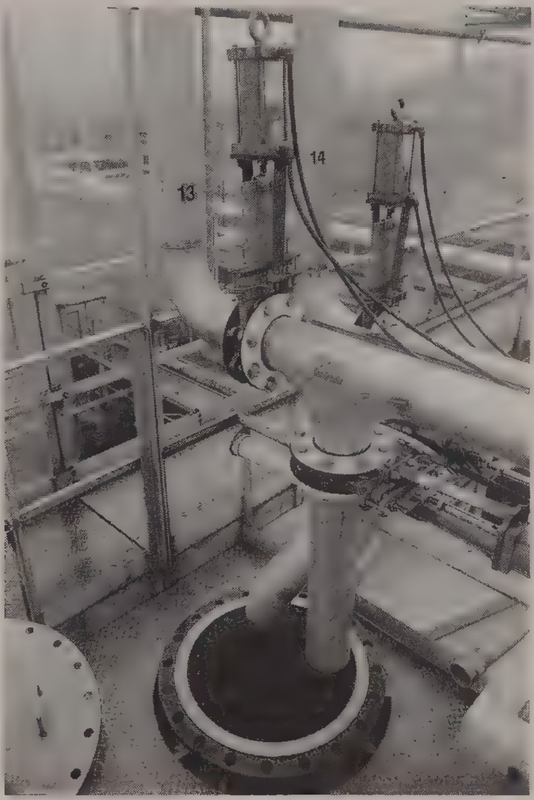




TOP: Obstructions in must lines have been replaced with long-radius sweep elbows, soft-tees, and knife-gate valves.

LEFT: Destemmers feed an eight-way valve that directs must through transfer lines to fermentors.

Photos by Don Neel

screw conveyors. Now, the belt conveyors move the clusters more gently and faster (100 tons per hour), and uses one-third less horsepower than a conventional screw conveyor. The incline belt conveyor has perpendicular half-inch crescents molded into its surface and carries grapes about 20 feet at a 20% angle up to the destemmers.

Over the past two years, the number of destemmers at Gallo of Sonoma was doubled from two to four; added together, the destemmers can process more grapes at optimum speeds, further reducing maceration. A third Delta E80 was added to two Delta Model E80 destemmers, which each handle 80 tons per hour. The fourth destemmer has been a different, experimental destemmer each year. There are no crusher rollers in the Delta destemmers. Equipment operators are able to control the speed of the belts and are therefore able to feed a consistent volume of grapes to the destemmers, an important factor to achieve maximum performance from the destemmers.

"We have experimented with three different destemmers over the last three years," says Bob Bertheau, winemaker at Gallo of Sonoma. "We've substantially increased our knowledge of optimal destemmer performance and believe it categorically impacts wine quality."

New eight-way valve

Two Kiesel electric-driven, progressive-cavity, variable-speed, float-control, SP24 FTF must pumps were installed in 1998 under the two new destemmers. The pumps push the must through an eight-way automated, multidirectional, fully-ported valve to fermentation tanks. Together, the eight-way valve and curved must lines look like a five-foot tall head of garlic. The valve has a simple motor control selection allowing an operator to switch from one transfer line or tank to another within three to five seconds. This system allows uninterrupted unloading of grapes, so no grapes are held up in trucks in the sun. The valve is designed for low drag, and the pressure was dropped from 50 lbs. to 22 lbs. at the must pump.

Piggable must lines

Obstructions in must lines and restrictions that macerate fruit traveling to tanks have been eliminated by installing 5,000 feet of 6-inch diameter must lines and the two eight-way valves. Must lines, which previously were in assorted sizes, have been replaced with one consistent pipe size and round corners throughout. A round rubber object, called a pig, that is equal to the diameter of the line can travel through the entire system without being stopped, hence the term "piggable."

Large, six-inch diameter, long-radius sweep elbows have been added in the must lines between the destemmers and fermentation tanks. The elbows handle the solids in the must with less friction. Butterfly valves in the must lines, which obstruct flow, have been replaced with knife-gate valves, that open fully. This removed all obstacles from the center of the valve and keeps the system free-flowing.

To further enhance gentle fruit handling, Gallo of Sonoma engineers invented low-maceration "soft-tees." Installed at the intersection where must travels from one line to another at the top of the fermentation tank, they replaced sharp T-valves and have a bowl-shaped pathway, where all blunt edges have been removed for less maceration. The soft-tees have no abrasive corners that tear must.

With these system improvements — although juice and skins move through must lines at 100 tons per hour and travel to fermentors at 600 gpm — the integrity of the fruit is protected.

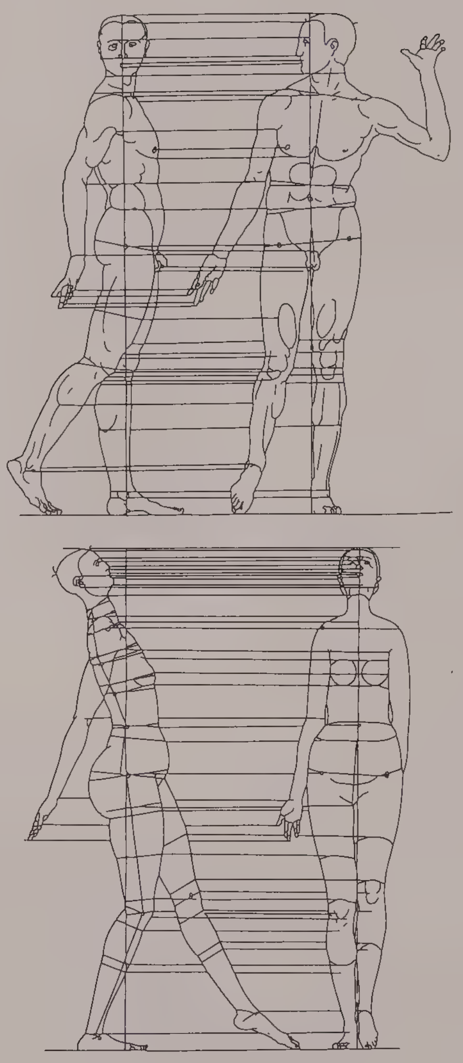
Rotary fermentors

Gallo of Sonoma has also installed four new 700-hectoliter rotary fermentors, increasing its rotary fermentation capacity by 25%. "Rotary fermentors give us another valuable tool to develop different styles of wine for different programs," says Bertheau. "The quick, yet gentle extraction can be ideal for varietals like Pinot Noir, but also provides the optimum environment to conduct extended maceration on our vineyard-designated Cabernet Sauvignon."

The volume of a 700-hl rotary fermentor equals that of a 20,000-gallon static fermentor, and holds about 60 tons of destemmed red must. Inside the rotary fermentors, mixing bars were installed, which gently break up the cap during rotation of the fermentor.

"Our winemaking team didn't believe the cap was breaking up properly," says DePonte. "We added stationary mixing bars inside the fermentors to gently break up the cap and the result was better mixing with fewer total rotations."

Paul Cassayre, the engineer who designed the layout of the Gallo of Sonoma winery, designed the belt conveyor system and the new receiving pits. His input on moving red grapes from the truck to the fermentors and pomace to the press has contributed significantly to the successful gentle handling of fruit.



Drawings from Albrecht Dürer's *Proportionslehre*, ca. 1528

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Another of his engineering ideas is the wide sweep elbows, which cut down on friction and reduce the pressure of must traveling to tanks.

More Improvements

Refrigeration system

The winery's new refrigeration system has replaced an ammonia refrigeration plant and achieved greater efficiency and a higher level of safety.

An ammonia plant which used three 500hp rotary screw compressors was replaced with 12 100hp R22 rotary screw compressors. All the chilled water that cools the fermenting wine has a common single-point temperature control header. As a result, Gallo of Sonoma achieved the lowest KW-hour demand in three years during the 1998 harvest. The system has also lowered noise decibel ratings from 94 to 75 for a safer work environment. It includes three new 400-ton, air-cooled Trane Manufacturing standard R22 glycol chillers. Using 100 hp screw compressors and air-cooled condensers, it pumps 3,000 gpm of 40°F to 25°F glycol to all jacketed tanks and the barrel cellar.

New tanks

Winemaking programs require a diversity of tank sizes to accommodate the different volumes of wine. Therefore, Gallo of Sonoma installed nine new Mueller jacketed storage tanks: four at 75,000-gallon and five 40,000-gallon capacity.

Making Our Vision Real

A poster on the wall in the conference room of the engineering office claims that the Gallo of Sonoma team is a "**MOVR** — Making Our Vision Real." Committed to continuous improvement, they are proud of their bias toward change. Not only that, they have a sense of urgency about achieving premium wine production on a large scale.

"This means winemakers are given state-of-the-art equipment which allows more creativity in developing our top-quality varietal programs, and the engineers help us realize our goals," concludes Bertheau. The Gallo of Sonoma winery design staff is addressing progressive issues that they believe will contribute to the production of increasingly higher quality wines by the entire industry. ■

CHALK HILL ESTATE VINEYARDS & WINERY

Farming Chardonnay clones to the optimum

by Eleanor & Ray Heald

Chardonnay comprises 80% of production at Chalk Hill Estate Vineyards & Winery (Healdsburg, CA). It is the job of Chalk Hill's viticulturist Mark Lingenfelder to optimize wine quality from each of Chalk Hill's 35 different Chardonnay blocks. This responsibility includes choice of rootstock, spacing, trellis, and clone. In 1989, Chalk Hill began extensive Chardonnay clonal trials, and the results are currently being evaluated.

"Even in the late 1980s, there was excitement building about Dijon Chardonnay clones from France," Lingenfelder recalls. "But the timing wasn't right to include them in our first clonal trial. These clones weren't available for planting in California until the early to mid-1990s. We wanted to start a clonal trial immediately and included all the certified clones available from Foundation Plant Materials Service (FPMS) at UC Davis.

"We were facing extensive replanting as all of our vineyards were on AXR-1 rootstock. Our best quality Chardonnay was from an 'Old Wente' type field selection that we refer to as the 'Shot Berry Clone' that was planted in 1974. As is the case with virtually all of these 'Old Wente' types, ours was infected with latent leaf roll virus and could not be used on new plantings with rootstocks other than AXR-1.

"The only certified virus-free clones commercially available in 1989 were UCD Clone 4 and 5, two very similar clones. We had planted Clone 4 extensively in 1980 and 1981, and although it made good wine, it didn't have the density and concentration of the Shot Berry Clone and was also more prone to overcropping and bunch rot.

"Our hope in 1989 was that one of these 11 UCD clones would give us the yield and quality we had enjoyed from the Shot Berry Clone but without the associated virus. Our only other choice would have been to replant with UCD Clone 4 or Clone 5 exclusively."

In addition, Lingenfelder had no good reasons to expect that Dijon clones were going to be best for Chalk Hill vineyard conditions. While he's convinced that the Dijon researchers did a very good job of selecting the highest-quality clones for Burgundy conditions, he notes that it would be naive to assume that these clones would be ideal for California.

"Dijon clones are designer clones," he continues. "They were specifically selected to plant in the soils and climate of Burgundy. The rigorous French process of selection focused on clones that did best under the specific Burgundy viticultural climate and soils, conditions which are very controlled and governmentally regulated.

"The whole French system is different than ours, with required meter by meter spacing. Only certain rootstocks can be used, and only a specific number of buds per vine can be left at pruning. Burgundy vineyards are not irrigated, and harvest can only begin on an approved date.

"Our commitment was to optimize quality, and we needed to find clones that would be suitable for our climate and soils. The earlier we started our research, the more information we would have that would be directly useful to us and to the industry in general."

First generation

In 1988, when preparing for the trial, Lingenfelder reviewed Jim Wolpert's work done in the Department of Viticulture & Enology at UC Davis in the early 1980s, which included six FPMS clones — 4, 5, 6, 14, 15, 16. He selected five of those (4, 6, 14, 15, 16) for the trial and added six more (17, 18, 20, 21, 22, and 23) that had become certified since Wolpert's work, for a total of 11.

Working in cooperation with UC Cooperative Extension Viticulture Farm Advisor Rhonda Smith, Chalk Hill made its Shiloh West vineyard (a few miles west of the winery) the site for the clonal trials. "We knew that Shiloh West had high vigor and yield potential based on our experience with the nearby Shiloh East block," says Lingenfelder.

Shiloh East was planted in 1984 to Clone 4 Chardonnay on AXR-1 spaced 8x12, with a 48-inch wide, divided canopy U-trellis. "Shiloh East had consistently produced very good, though not excellent, wines at very high yields. We chose a similar spacing and trellis for the Shiloh West clonal trial knowing that the results would likely be most relevant to high vigor, high yielding sites with a divided canopy trellis system. To properly evaluate these clones on our more typical lower vigor sites, another trial would be needed."

Clonal trial design

For the trial in 1989, Chalk Hill planted in a randomized complete block design with five replications of each treatment (clone). The 11 clones are scattered randomly through each replication in groups of six vines each, on AXR-1 rootstock.

Spaced 6x12, vines are on a 48-inch wide U-trellis with bilateral interlocking S-cordons and a vertically shoot-positioned divided canopy. On each side, there are two fruiting wires and one pair of moveable wires. Vines are spur pruned to 40 to 50 buds per vine.

For harvests 1994-1997, maturity parameters — including °Brix, pH, and TA (g/L) — can be found in Table I. The effect of clone type on yield components is in Table II. Table III provides pruning weights per vine in kilograms.

One of the pitfalls of clonal research is that it takes some years before the vines

TABLE I
Effect of clone on maturity parameters
Chalk Hill Winery 1994-1997

CLONE	°BRIX Low	°BRIX High	pH Low	pH High	TITRATABLE ACID (g/L) Low	TITRATABLE ACID (g/L) High
FPMS 4	21.9	24.1	3.22	3.30	6.6	9.3
FPMS 6	22.9	24.0	3.25	3.38	6.0	7.9
FPMS 14	22.2	24.0	3.26	3.35	6.3	8.1
FPMS 15	22.9	24.0	3.27	3.44	6.3	8.1
FPMS 16	21.7	24.2	3.39	3.61	6.0	7.7
FPMS 17	22.4	23.3	3.30	3.44	5.7	7.9
FPMS 18	23.0	23.9	3.27	3.39	6.3	7.8
FPMS 20	22.7	23.5	3.27	3.42	6.4	8.0
FPMS 21	23.4	23.8	3.28	3.43	6.0	8.2
FPMS 22	23.6	23.8	3.26	3.44	6.3	8.5
FPMS 23	23.3	24.7	3.26	3.42	6.1	8.5

TABLE II
Effect of clone on yield components
Chalk Hill Winery 1994-1997

CLONE	YIELD VINE (kg) Low	YIELD VINE (kg) High	CLUSTER WEIGHT (g) Low	CLUSTER WEIGHT (g) High	BERRY WEIGHT (g) Low	BERRY WEIGHT (g) High
FPMS 4	8.38	15.33	204	295	1.31	1.59
FPMS 6	5.59	10.97	153	189	1.30	1.47
FPMS 14	6.89	10.53	187	247	1.21	1.43
FPMS 15	4.94	8.12	114	149	1.06	1.55
FPMS 16	4.26	7.55	101	140	1.55	1.97
FPMS 17	7.25	13.00	135	209	1.32	1.52
FPMS 18	8.04	12.55	147	203	1.25	1.51
FPMS 20	8.17	12.82	156	194	1.46	1.66
FPMS 21	7.32	13.00	140	178	1.37	1.60
FPMS 22	7.80	11.52	133	166	1.36	1.59
FPMS 23	6.97	12.89	135	185	1.37	1.52

are mature enough for experimental wines to be made and evaluated. Only wines from the 1996 vintage have been evaluated and given preliminary rankings from 1 (most preferred) to 3 (least preferred). With the possible exception of Clone 16, all of the wines, even those least preferred were judged to be of good or acceptable commercial quality. The wines rated most preferred, were judged to be of exceptional quality. In 1997, no wines were made due to severe bunch rot in the trial. Clonal wines were made in 1998, but have not been evaluated yet.

The ultimate goal of the experiment was to determine how well these clones performed when made into wine using Chalk Hill's standard winemaking practices. These standard practices were duplicated as closely as possible with two notable exceptions. The experimental wines were inoculated with Prise de Mousse yeast (native yeast is standard), and four-year-old (30% to 40% new oak is standard) French oak barrels were used to minimize oak influence.

Winemaking procedures were as follows: 1) Whole clusters were pressed at up to 1.5 bar in a Willmes bladder press. 2) Juice was chilled to 10°C and settled 24 hours. 3) Juice was racked to barrels, 30 ppm SO_2 added, inoculated with 1-lb/1,000-gal of freeze-dried Prise du Mousse yeast. 4) The wine was barrel fermented, topped at dryness, and inoculated with freeze-dried Viniflora Oenos malolactic bacteria. 5) During malolactic fermentation, lees were stirred weekly. 6) At completion of malolactic fermentation, free SO_2 was adjusted to 25 ppm. 7) Lees were thereafter stirred monthly. 8) Wine was aged for eight months *sur lie.* 9) Bottling was done with 30 ppm free SO_2.

First generation summary from the 1996 harvest

In the trial, FPMS Clone 4, the high-yielding clone which has been the most widely planted in California, produced the highest yields, highest TA, and lowest pH. It was also prone to rot. Wine quality was ranked 3 (least preferred).

FPMS Clone 6, exhibited high vigor and high yields and had small clusters; it made very good wine, ranking as category 1 (most preferred). Lingenfelder suggests that it is potentially useful for low-vigor sites or on a divided canopy on higher vigor sites.

FPMS Clone 14 had moderate yield, very low vigor, and very large clusters, but small berries. From the clonal block, it made wine ranking at level 3, but Lingenfelder proposes it may have potential for high vigor sites with close spacing.

FPMS Clone 15 was low-yielding with small, loose clusters and very small berries. Lingenfelder notes that it's cluster morphology is similar to Chalk Hill's Shot Berry Clone or Old Wente Clone. Early ripening and very rot resistant, it ranked in category 1 and was the most highly preferred wine with this ranking in Chalk Hill's tastings. As such, it is projected to be ideal for cool climates and Reserve Chardonnay programs, but with yields of only about 50% of Clone 4, it will probably not be widely planted.

FPMS Clone 16 is highly regarded in Australia, but in Chalk Hill's clonal trial, it performed poorly with lowest yield, lowest sugar, and highest pH; it was also very susceptible to damage by thrips and was very rot prone. The wine was least preferred (3). This clone probably has little or no commercial value.

FPMS Clone 17 had moderate yield but was higher yielding with larger clusters than Clone 15. Otherwise, it was similar, with many small or "shot" berries, and showed some rot resistance. Lingenfelder projects it would be useful in cool climates and on rot-prone sites. In wine quality, it ranked along with Clone 15 as most preferred. Although it yields significantly less than Clone 4, it probably has more commercial potential than the lower yielding Clone 15.

FPMS Clone 18 had high yield, moderate vigor, and early sugar accumulation. In Italy, this clone is used primarily for sparkling wines, but it made one of the least-preferred still wines using Chalk Hill methods.

FPMS Clone 20 was late ripening with high vigor and high yield. Wines were ranked average.

FPMS Clone 21 had high yield, high

TABLE III
Effect of clone on pruning weights
Chalk Hill Winery 1994-1997

CLONE	PRUNING WEIGHT PER VINE (kg)	
	Low	High
FPMS 4	1.83	2.40
FPMS 6	2.02	2.94
FPMS 14	1.23	1.39
FPMS 15	2.00	3.10
FPMS 16	2.33	2.81
FPMS 17	2.25	3.27
FPMS 18	2.11	2.90
FPMS 20	2.51	3.41
FPMS 21	2.59	3.73
FPMS 22	2.89	3.75
FPMS 23	2.75	4.05

TABLE IV
FPMS Chardonnay clone numbers and sources

CLONE	SOURCE	DAYS OF HEAT TREATMENT
FPMS 4	Martini 5 V21, Olmo #66	90
FPMS 6	Martini 3 V4, Olmo #68	164
FPMS 14	Martini 1 V20, Olmo #65	111
FPMS 15	Prosser, WA; LR2V6	173
FPMS 16	P1364283, Rutherglen, Australia	60
FPMS 17	Robert Young	62
FPMS 18	Rauscedo 8, Italy	none
FPMS 20	Conegliano 6, Italy	none
FPMS 21	Conegliano 7, Italy	none
FPMS 22	Conegliano 10, Italy	none
FPMS 23	Conegliano 11, Italy	none

TABLE V
French Chardonnay clone numbers and sources

ENTAV-INRA#	SOURCE
75	Cote-d'Or
76	Saone-et-Loire
78	Cote-d'Or
95	Cote-d'Or
96	Cote-d'Or
352	Espiguette

vigor, and ripened early. Wines were ranked below average.

FPMS Clone 22 was early ripening, high vigor, and high yielding, but its wine scored in tier 1. Lingenfelder believes it would be excellent in cool climates on low-vigor sites or on high vigor sites with a divided canopy.

FPMS Clone 23 was also early ripening and had high vigor and high yield, but it ranked below average in wine quality.

1992 Dijon nursery block

"From the Clone 4 and 5 monoculture of the 1980s, the pendulum in the early 1990s swung in the other direction, at least among some of the more quality-oriented growers and wineries," Lingenfelder notes. "But many planted Dijon clones blindly with no prior experience on their sites or with their winemaking practices. As we continue to replant our Chardonnay vineyards, we hope to have enough viticultural data and winemaking experience to make the best clonal selection for each site."

In 1992, French clones (Dijon clones) certified by Etablissement National Technique pour l'Amélioration de la Viticulture — Institut National de la Recherche Agronomique, ENTAV-INRA became available, and Chalk Hill wanted to compare their performance to the 11 FPMS clones in the Shiloh West clonal trial.

In 1994, vines in a block adjacent to the clonal trial were T-budded to ENTAV-INRA clones 75, 78, 95, and 96. Clone 352 was planted in 1992 in a small hillside nursery increase block.

Results from T-budded vines

ENTAV-INRA 75 is described in French literature as a high-yielding clone that produces balanced, but neutral, diluted wines. In 1996, from the T-budded Shiloh West vines, it had the lowest yield (5.42 tons per acre) of the Dijon clones and produced a very rich and concentrated wine, receiving a high rank in the tastings.

ENTAV-INRA 78 was noted as having even higher yields than clone 75, but producing slightly expressive wines. Chalk Hill found that it produced a good, but not outstanding wine.

ENTAV-INRA 95 is regarded in French literature as a high-quality clone with moderate yields, producing wines which are complete and balanced with good aromas and rich texture. In 1996, it had the highest yield (6.42 tons per acre) of the four Dijon clones in the T-budded block. It produced a rich, well-balanced wine which was highly preferred in Chalk Hill tastings.

ENTAV-INRA 96 is cited in French literature as high yielding and producing well-balanced, aromatic, and lively wines. It is used in the Champagne region for sparkling wines and in Burgundy for still wines. In Chalk Hill's wine evaluations, it had the shortest finish and was the least preferred of all the Dijon clones.

ENTAV-INRA 352 (Espiguette) has no available French information, but it is widely planted in Oregon where it produces good quality wine and has slightly higher yields than the Dijon clones. Chalk Hill evaluated the clone as having moderate yield and good quality in 1996, although somewhat more dilute in 1997, probably due to high yield.

Second generation — replicated clonal trial

A second generation trial began with planting in Oak Hill block C in 1996. It included the 11 clones from the first generation and six French ENTAV-INRA Clones — 75, 76, 78, 95, 96 and 352 (all but 352 are Dijon clones), for a total of 17. All French clones available at that time were included.

Oak Hill block C is Spreckels loam with moderate vine vigor potential. It is about half as deep and sandier, with more gravel, than Shiloh West. "This block was previously planted on AXR-1 with the Shot Berry Clone of Chardonnay," says Lingenfelder. "Until it declined due to phylloxera, it consistently produced some of our best Chardonnay. It was judged as the ideal site to evaluate how these clones perform on a low vigor site with a standard vertical trellis."

The second generation trial has the

same design as the first, that is, a randomized complete block design with five replications of each treatment (clone) on 3309 rootstock. Vines spaced 6x8 are spur pruned to 20 to 25 buds per vine on a unilateral cordon. Training is on a six-wire trellis with vertical shoot positioning. The remainder of the block is planted with a non-replicated trial including 0.70 acres of each of the 17 clones. Larger scale individual wine lots will be made from these vines to verify the results of the small lots made from the replicated trial.

Trials in Burgundy

Chalk Hill's estate-vineyard concept is similar to that of a Burgundian estate, such as Meo-Camuzet in Vosne Romanée. Despite their greater experience, Burgundian vignerons don't have all the answers when it comes to replanting. Owner Jean-Nicolas Meo reports that Meo-Camuzet is currently experimenting with four of the five Dijon clones that Lingenfelder chose for Chalk Hill's second generation trials.

In general, Vosne Romanée soils are *limono-argileux*, a fine sandy-clay mixture with pebbles and limestone, and the vines are cane-pruned. Meo reports the results of his trials as follows:

CTPS 76 had low to average vigor, ripened early, and made very good, balanced wine. He is seriously considering CTPS 76 as one of the clones he will use for replanting.

CTPS 78 had high vigor, a short growing cycle, and made a neutral wine with high acidity; it is most suitable, therefore, for Crémant, the sparkling wine of Burgundy.

CTPS 95 ripened early and had average yield. The wine was rich and ageable. Meo believes the clone shows best in heavy soils on devigorating 3309 rootstock.

CTPS 96 exhibited big bunches and average to high yields during a normal growing season. Its wine was powerfully rich, but with lower acidity.

Where does Chalk Hill go from here?

"The first generation trial has provided us with four years worth of consistent detailed viticultural data which has allowed us to characterize the viticultural traits of each of the eleven UC Davis clones," notes Lingenfelder. "Although this is very helpful in making future clonal decisions, we have only the 1996 wines to evaluate for wine quality.

"We continue to plant and replant additional Chardonnay acreage and have no choice other than making clonal decisions based on limited information currently available."

Based on this information, Chalk Hill's clonal choices for most recent Chardonnay plantings have been as follows: In 1995, 15 total acres were planted with equal amounts of Clones 75, 78, 95, 96, and 352. These were chosen before Chalk Hill had any winemaking experience with these clones — and were chosen strictly for

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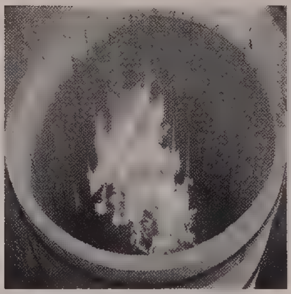
Selection



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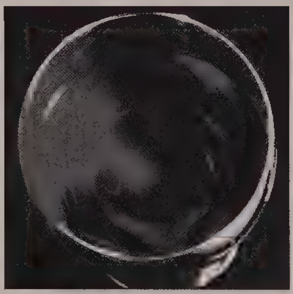

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clonal diversity.

In 1996, 12 acres adjacent to the second generation clonal trial were planted to equal parts of all 17 clones. This is an expanded version of the replicated trial intended to make "commercial" size lots of each of these 17 clones.

In 1997, four acres immediately adjacent to the first generation trial — with the same soil, same spacing, same trellis, and different rootstock (3309C) — were planted with Clone 22. It had produced Chalk Hill's favorite wine in the trial in 1996 and, because of its high vigor, was well-suited to wide spacing (6x12) and a divided canopy.

In 1998, 17 acres in the Shiloh East Block, adjacent to the first generation trial, were replanted with 1103P rootstock and equal acreage of the five most preferred clones from 1996: Clones 6, 22, 15, 17, and 95. The higher vigor clones (6 and 22) were planted at the upper end of the block where the soil is more shallow and rocky and has less vigor potential. Clones 15 and 17 (the most rot-resistant) and clone 95 were selected for the lower end of the block, where the soil is deep, moist, and fertile, and where previously, Clone 4 was often damaged by bunch rot.

Also in 1998, in a new planting of 10 acres at Wright Creek in a cool, rot-prone site, Clones 15 and 17 were selected for wine quality, early maturity, and resistance to bunch rot.

Conclusion

Is the data collected by Lingenfelder and Meo transferable? A comparison between the Chalk Hill results, French literature, and the Meo-Camuzet results indicates that some is, some is not. The most important lesson to be learned from Lingenfelder and Meo may be taught by their example. To discover what grows best in a vineyard, experiment — even if the vineyard is in Burgundy. ■

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KLEIN FAMILY VINTNERS

UNIQUE EQUIPMENT BOOSTS FLEXIBILITY

by Susan Diane

New equipment was installed at Klein Family Vintners (Windsor, CA) in 1998 for production of Rodney Strong Vineyards and Windsor Vineyards wines. It includes a unique belt conveyor system that can deliver either white grapes or fermented red must to each press with minimal interruption. The design simplifies gentle handling of grapes, while saving labor and increasing flexibility in winemaking.

The new equipment also includes two new Bucher tank presses, which supplement two existing Bucher tank presses, and six new A&G rotary fermentors (three 50-ton and three 28-ton) built and installed under contract by WESTEC (Healdsburg, CA), a division of Alary Corp.

It is a multi-purpose system, according to the WESTEC design team that developed the concept for the new equipment. It uses the same equipment to handle whole cluster or mechanically-harvested white grapes and to deliver fermented red must from rotary fermentors to the presses.

Increased flexibility

According to winemaker Rick Sayre, this new system is safer and easier for the crew to operate and provides more options for fruit handling. He can press whole-cluster white grapes to achieve gentler handling to improve the winery's white, blush, and sparkling wines, or he can choose to crush high-acid white grapes to allow skin contact in a tank. He has achieved time-saving advantages using the new rotary fermentors, while realizing an increased efficiency by doubling tank pressing capacity.

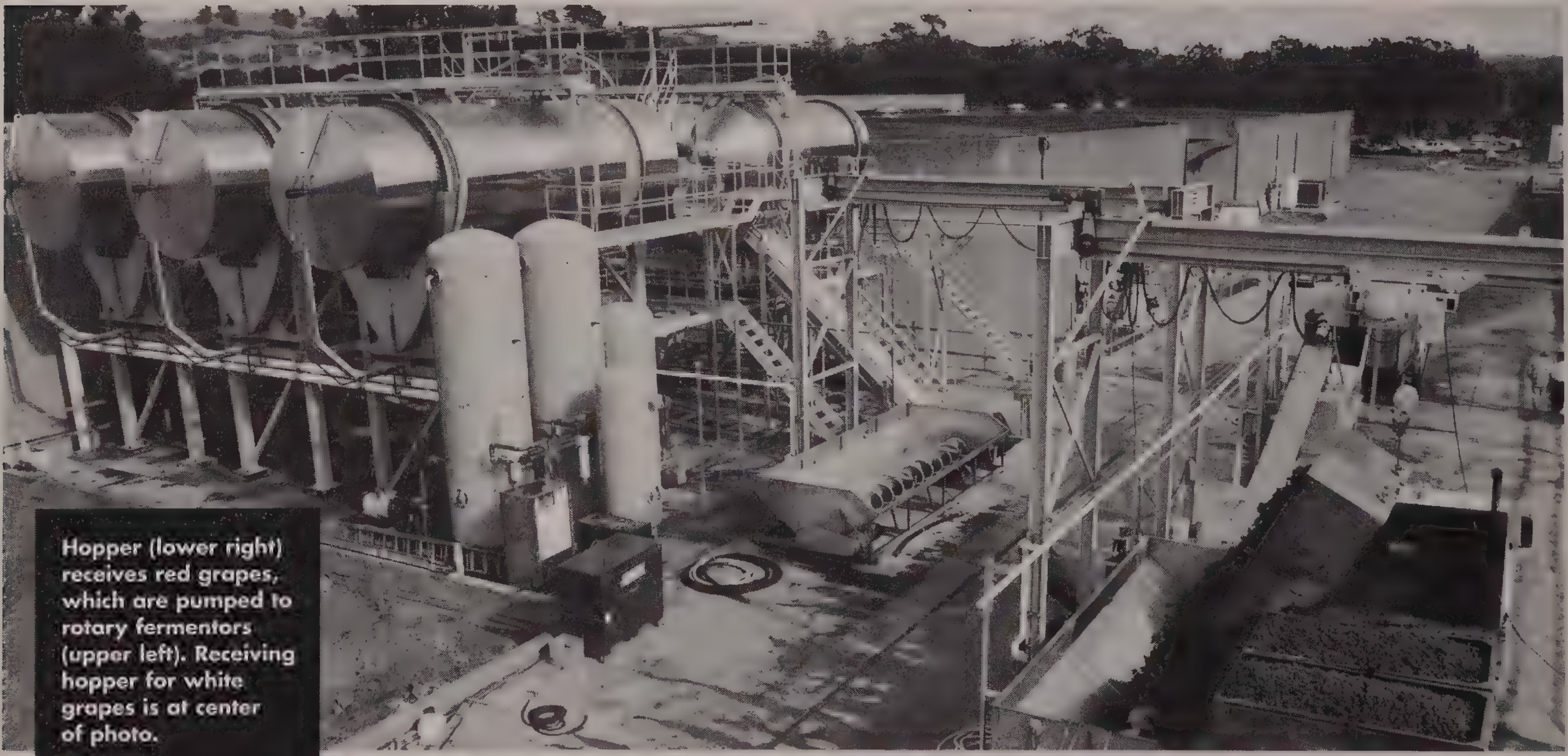
The emphasis during the design phase was to consider different ways that a winemaker might want to handle grapes during harvest. For example, Sayre wanted to improve the ability to handle mechanically-harvested grapes.

"Mechanical harvesting is getting better; it is the way of the future," he says. "Mechanically harvested grapes can arrive in five-ton gondolas each holding up to 400 gallons of juice, rather than two-ton valley bins of hand-picked grapes. We must have equipment to handle both situations."

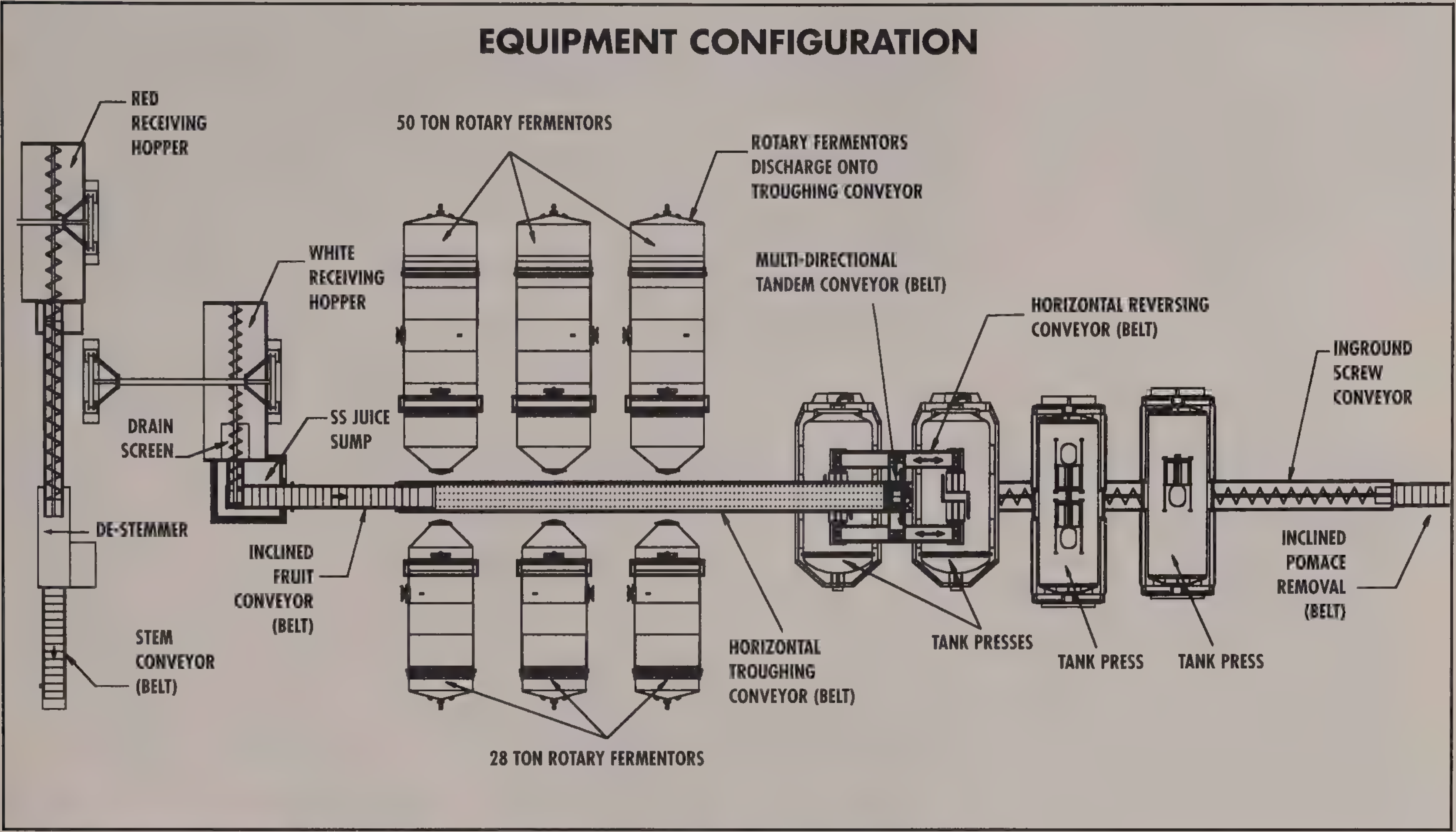
About one-third of the total grapes received (including both red and white grapes) are machine harvested each year at the winery. The receiving equipment must be able to handle the free run juice at the white receiving hopper, directing it to a tank and bypassing the press.

The receiving hopper has two wedgewire de-juicing screens — a 30-inch juice sump screen in the nose of the receiving hopper and a 36-inch screen in the hopper trough. The screens are used to separate free run juice from the grapes before grapes go to the first incline conveyor.

The 400-gallon capacity sump below the de-juicing screens has a welded, full coupling at the bottom with an internal plastic pipe plug. The plug screws into the drain coupling at the bottom of the sump. Free run juice is pumped out of the sump to a tank. Waste water from cleaning drains out the bottom of the sump and is piped to the winery wastewater pond.



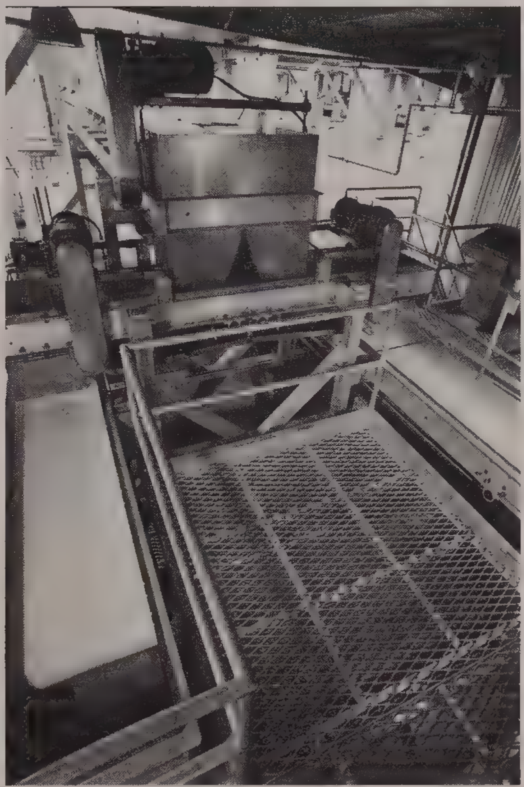
Hopper (lower right) receives red grapes, which are pumped to rotary fermentors (upper left). Receiving hopper for white grapes is at center of photo.



EQUIPMENT CONFIGURATION

RED RECEIVING HOPPER
50 TON ROTARY FERMENTORS
ROTARY FERMENTORS DISCHARGE ONTO TROUGHING CONVEYOR
WHITE RECEIVING HOPPER
MULTI-DIRECTIONAL TANDEM CONVEYOR (BELT)
HORIZONTAL REVERSING CONVEYOR (BELT)
INGROUND SCREW CONVEYOR
DRAIN SCREEN
SS JUICE SUMP
DE-STEMMER
INCLINED FRUIT CONVEYOR (BELT)
INCLINED POMACE REMOVAL (BELT)
STEM CONVEYOR (BELT)
HORIZONTAL TROUGHING CONVEYOR (BELT)
TANK PRESSES
TANK PRESS
TANK PRESS
28 TON ROTARY FERMENTORS

Above: Chutes direct fermented red must to horizontal troughing belt conveyor.



Top: Grapes are delivered into a pantleg chute, which divides the quantity in half and delivers it to the tandem conveyor.

Left: For safety, as the hopper moves away from the press, a folding grate automatically covers access to the pomace screw conveyor.

Photos by Lenny Siegel

A food grade PVC incline belt conveyor delivers white grapes from the receiving hopper to a horizontal troughing conveyor. The 30-inch wide incline belt conveyor has three-inch cleats spaced 12 inches apart to hold grapes on the belt. Grapes travel up 26 feet at an approximate 42°angle. The incline belt conveyor is controlled by a variable speed inverter.

A multi-purpose catwalk system provides ease of access and improves safety for employees. From the catwalks, workers can hand-sort white grapes on their way to the press or access drain valves on the rotary fermentors.

After fermentation, red fermented must drops nine feet from the rotary fermentors through stainless steel chutes at a 40° angle. The chutes reduce velocity of the material and channel the fruit to the center of the horizontal troughing belt conveyor.

The horizontal troughing-style conveyor is smooth PVC food grade plastic, 36 inches wide by 68 feet long. It delivers material to the multi-directional tandem belt conveyor. It can deliver white grapes to the presses, or it can receive fermented red material from the rotary fermentors and deliver it to the presses.

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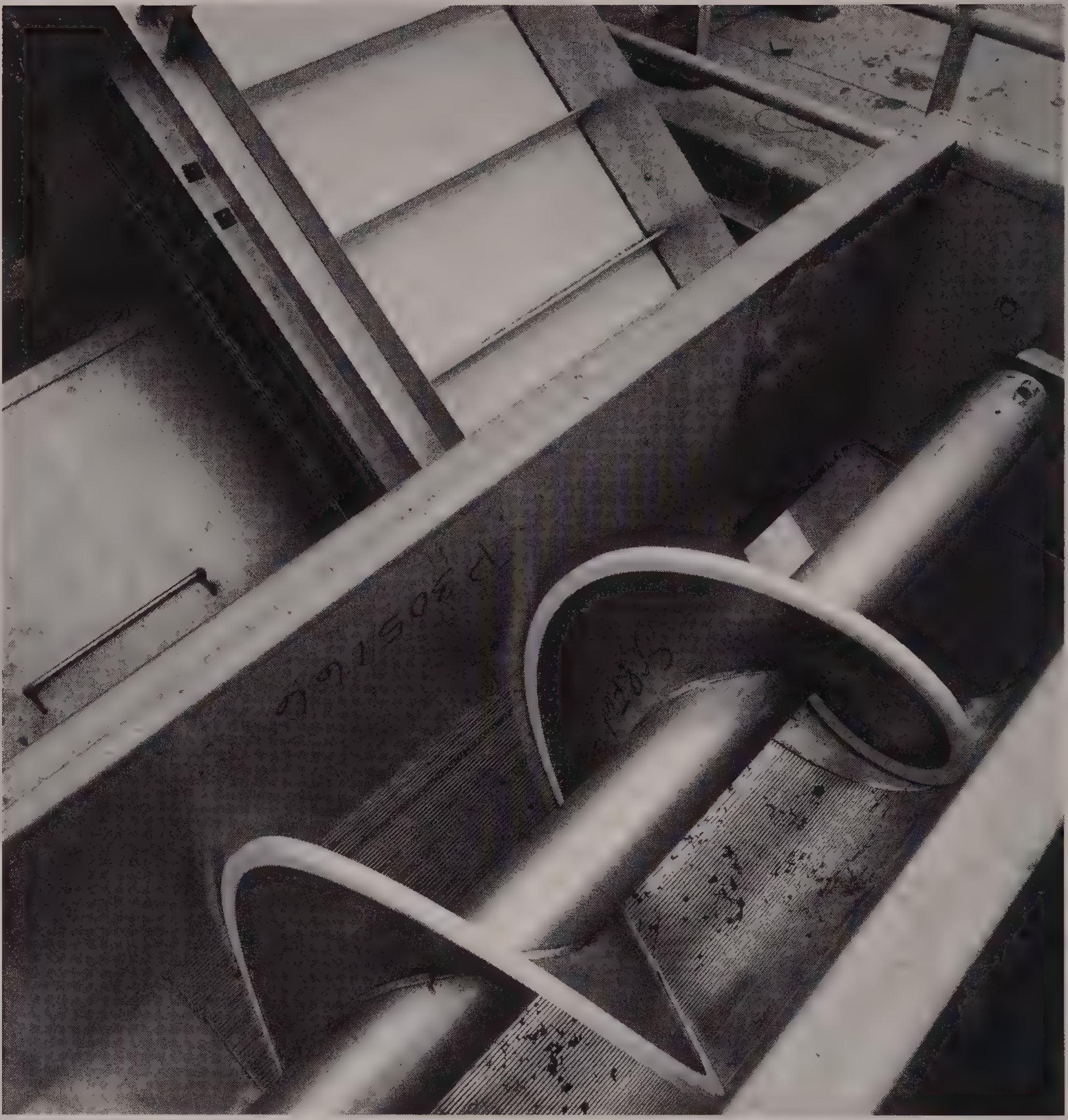


The white grape receiving hopper has two wedgewire de-juicing screens — one in the nose of the receiving hopper and one in the hopper trough. The screens are used to separate free run juice from white grapes before they go to an incline conveyor.

To allow handling of both red and white grapes, a nose wiper blade is positioned beneath the delivery pulley of the troughing-style belt conveyor to assist in cleaning. The wash out is in the center for easy access. White grapes are received during the day, and red grapes are pressed at night.

At the end of the troughing belt conveyor, grapes go into a separator, called a pantleg chute because it looks like a pair of pants. Grapes are delivered into the chute, which divides the quantity in half and delivers it to the tandem conveyor. The tandem conveyor has two 24-inch wide, smooth belt conveyors that feed two reversible, belted, cross conveyors which fill two doors of a press simultaneously. Designed so that the belt can run at half normal speed with half the normal size load, the tandem conveyor drastically reduces the confusion usually involved with filling two tank presses.

In this system, the belt conveyors can receive and deliver grapes without stopping. The operator fills both ends of a press simultaneously until the grapes start to mound up high. Then, the operator reverses the belted, cross conveyors to fill the second press. Meanwhile, the first press rotates to adjust the mound of fruit inside. When the grapes mound up in the second press, the belts are reversed again to feed the first press, and the process continues until the presses are full.

The four presses stand in a row; three have two doors. Below each two-door press is a pomace hopper with a right and left flight on the same screw conveyor shaft. It conveys material from both ends of the hopper to the center discharge point. The custom-built flared trough hoppers are moveable and have rollers that sit in a track. Beneath the row of presses and the pomace hoppers is a pomace screw conveyor, 74 feet long and 24 inches in diameter.

After the pomace hoppers have emptied their load into the pomace screw conveyor for delivery to the dump trucks, operators can easily pull the moveable hoppers out from beneath the presses to facilitate cleaning. For safety, as the hopper moves away from the press, a folding grate automatically covers access to the pomace screw conveyor to assure that employees will not accidentally slip into the screw conveyor. After the hopper is emptied, the hopper is easily pushed back into place under the press, and the safety grate folds back out of the way.

The hopper under the single door press also aligns over an opening to the pomace screw conveyor. A safety platform also rolls over the screw conveyor when this hopper is moved.

A rubber incline belt conveyor with three-inch cleats spaced 12 inches apart receives pomace from the screw conveyor and discharges it into a truck for removal.

Added efficiency

With the newly installed equipment, the time required to unload a full truckload of grapes is approximately one minute per ton for either station – red or white. The whole cluster press cycle is about 90 minutes for 25 tons, and two to three hours for 40 tons of crushed fruit.

The new production equipment was designed for maximum flexibility and sized for extreme circumstances. Although this system requires the same number of operators as needed before, it is more efficient because it handles more grapes, and the process is safer, cleaner, and runs smoother.

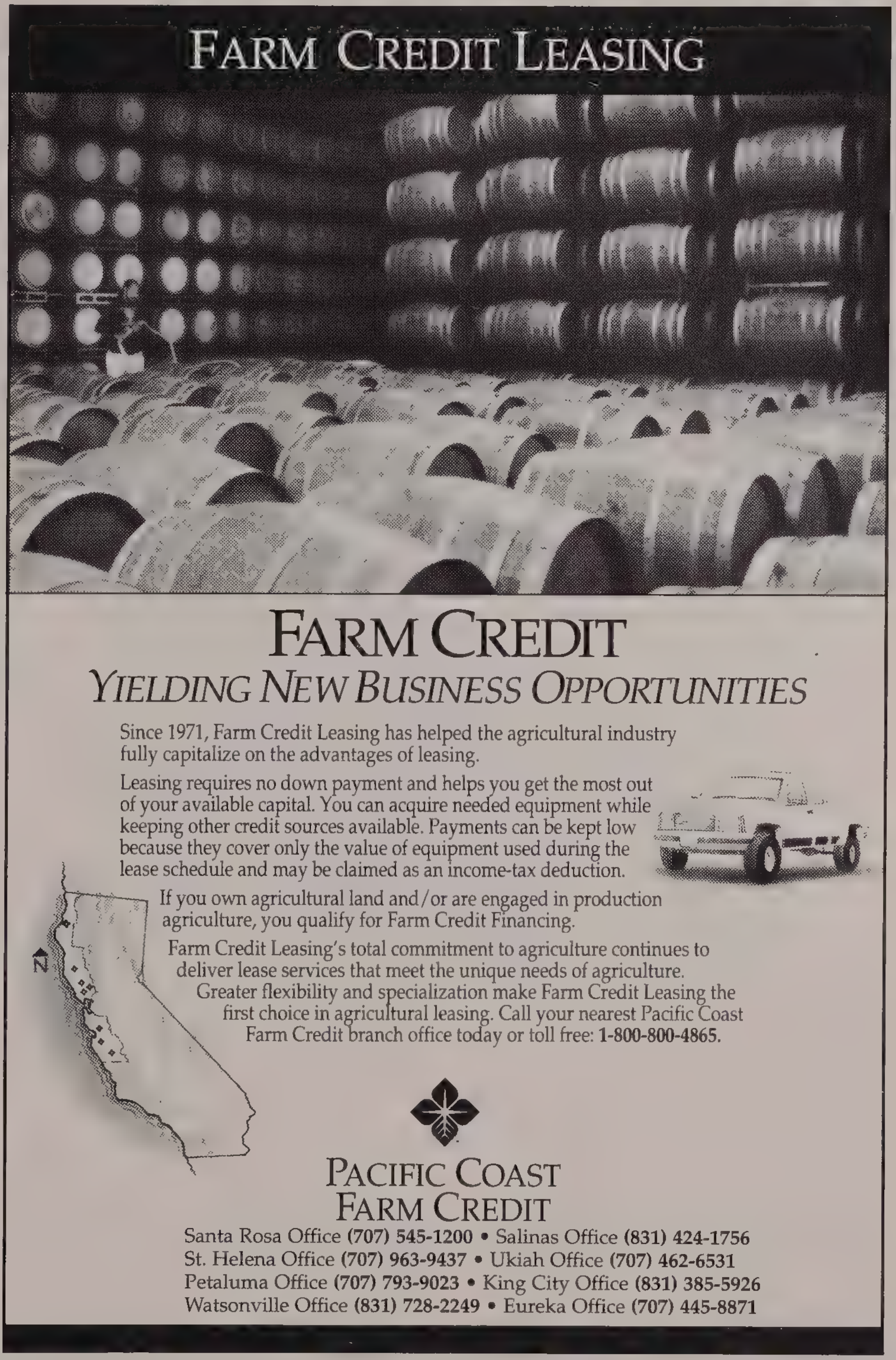
"We are still on a learning curve with some of the equipment," notes Sayre. "There is no simple recipe for using it. Consumer demand, driven by a good economy, is creating a need for wines that are softer and more supple with good varietal definition, and that is what we are striving to achieve.

"Although I like whole cluster pressing, I believe blending in some fruit that has been crushed and given skin contact can enhance the flavor and richness of a wine, but you have to be careful. Machine-harvested grapes are macerated in the vineyard. They are usually picked cold, but time is of the essence to get them in the press.

"The success of all decisions depends on accurate field samples and the assessment of the maturity you are looking for. But you have to be flexible when things don't go your way."

Rotary fermentation

"When it comes to winemaking, there are always several variables to consider each year. Every vintage is different. Some vineyards on the valley floor, especially older vineyards with virus, need all the extraction they



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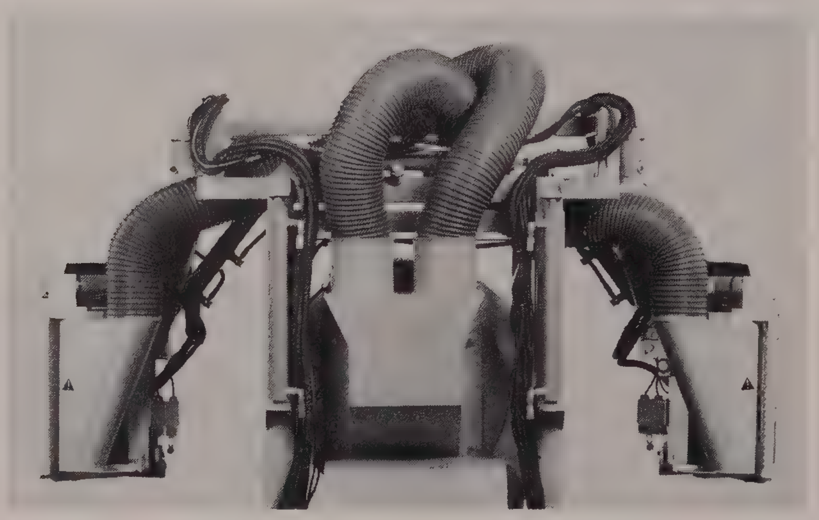

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can get. The rotary fermentor can be rotated more frequently to achieve better extraction. Mountain top vineyards that yield grapes with too much tannin are just the reverse and may need to be pressed before the alcohol gets too high. If you have a vineyard that benefits from extended skin contact, you probably wouldn't put it in a rotary."

Sayre believes that flexibility is the system's greatest advantage. "We don't have all the answers yet," Sayre admits. "It takes doing trials over two years or more, studying the differences in old and new vineyards with daily testing and tasting." To that end, a dozen lots of different red varietals were split between rotary and static fermentors in 1998. "Each method has those who prefer it. The static fermentors tend to produce wines with more power in the finish. Rotary fermentors produce wines with more seductive fruit, but they seem to lack length in the finish."

Rotary fermentors have created new challenges, according to Sayre. They allow less aeration and potentially more hydrogen sulfide. They can generate solids which cause the juice to be the consistency of a milkshake. Gentle treatment requires few rotations, but too few will not achieve enough extraction. They need to be monitored closely.

Once in awhile rotary fermentors can be dangerous. The software that was controlling one of the fermentor's rotation unexpectedly stopped a fermentor with the vent in the down position. It was a tense situation. Fortunately, a quick thinking operator grabbed a couple of wrenches and managed to open a manual vent to relieve the pressure, because CO_2 was trapped in the tank like a pressure cooker as the tank was rotated and unable to vent.

Sayre notes that Merlot, Zinfandel, and Pinot Noir all have different personalities in rotary fermentors, presenting another challenge. "We make the decision in the vineyard whether we're going to use rotary fermentors and for how long and for how many rotations," Sayre reports. "We must deal with all types of fruit, all variations in weather, temperature, vine maturity, and so on. The variables change every year. This new equipment gives us more winemaking options." ■

GYPSUM INJECTION INTO VINEYARD DRIP SYSTEMS

By Lizanne E. Wheeler,
Patrick D. Brown
Vineyard Water Systems

A common component of a vineyard irrigation system in the western U.S is the "gypsum machine," which consists of a tank with agitation paddles and an injection pump. Finely ground gypsum (calcium sulfate) is mixed with water to form a slurry within the machine, and is then injected into the irrigation system. Ideally, when the slurry mixes with the irrigation water, most of the gypsum dissolves into calcium and sulfate ions, which pass through the irrigation system and into the soil with the irrigation water. That is the idea, and the idea is quite sound. It is the practice that presents the challenges.

Why inject gypsum?

There are three generally recognized agronomic reasons for injecting gypsum into an irrigation system:

1) Gypsum contains calcium, and calcium is a secondary plant macronutrient. It plays an important metabolic role in cell elongation and division. Some crops require high levels of calcium during the growing season, and supplying sufficient quantities sometimes becomes a management challenge, depending on the Ca:Mg ratio in the soil. Magnesium ions may interfere with calcium uptake into plants. Calcium-magnesium ratios (optimal Ca:Mg ratio is 2:1 to 5:1) can also be favorably influenced with gypsum applications.

2) In irrigated viticulture, calcium plays an important role in the maintenance of soil structure. The soil colloids (clay and humus) possess negatively charged sites, which attract and hold positively charged ions (cations) in an exchangeable form. The structure of the soil is determined by organic matter, microbiological processes, and the relative ratio of calcium, magnesium, and sodium cations that are bonded to the negatively charged sites. If too many "cation exchange sites" are occupied by sodium ions, the soil colloids tend to disperse and pack tightly together. This reduces the size and number of pore spaces between the aggregates, making it difficult for water and air to infiltrate the soil. Replacing most of the sodium ions with calcium ions tends to aggregate the soil colloids, thus providing larger pore spaces, better water penetration, and improved soil structure.

3) The cation balance of the soil tends to come into equilibrium with the cation balance of the irrigation water, so irrigating with high-sodium water, Colorado River water for example, can lead to "sodic soils" (high levels of sodium in the soil causing de-flocculation of the soil colloids) and poor water infiltration. The cation balance of the irrigation water is expressed as the sodium adsorption ratio (SAR) and is a common laboratory analysis. Irrigation water high in sodium (SAR above 6.0) can be modified through the addition of calcium, either through the irrigation water or by direct application to the soil.

Irrigation water that is very low in total salts can also be a problem because its low infiltration rate produces more run-off under the emitters. This is due to the high surface tension of low-salinity water, such as Sierra snow melt. The addition of *any* salt will tend to reduce this surface tension and increase water infiltration rates. Gypsum is a very common choice for this application.

Dealing with the challenges

The practical challenges of injecting gypsum relate to plugging up the drip system. The most immediate incidence of gypsum plugging occurs either when more gypsum is injected than can be dissolved into the irrigation stream or when not enough time is allowed between the injection of the slurry and its arrival at the system filter. In either case undissolved gypsum coats the filter and plugs it. This can be overcome by reducing the concentration rate of the injection and, when possible, by moving the injection point farther upstream from the filter. In some cases growers move the injection point below the filter, but if the injection stream is not adequately pre-filtered, severe problems with plugged emitters can result.

If the gypsum is ground finer than the mesh size of the irrigation filters, the insoluble (non-gypsum) fractions can pass into the system, which presents another challenge. In many cases, these particles will pass through the emitter without causing any plugging problems. But often, because of their density, they settle out in areas of the irrigation system where the velocity of the water is low. This can occur in large mainlines as well as in the emitters themselves. Over time these silt-like deposits build up and affect the system performance. The deposits become difficult to remove, especially if allowed to remain over long periods of time. Because of this, it is recommended to frequently flush all mainlines and hose laterals with sufficient velocity to prevent these deposits from building up into a chronic plugging problem.

Perhaps the most common plugging problem associated with gypsum injections is lime scale formation. Lime scale (calcium carbonate) is formed when calcium ions (either naturally present in the source water or added as calcium sulfate in gypsum) combine with naturally occurring bicarbonates in the water. As described in "Formation of Lime Scale in Drip Irrigation Systems," (*PWV* March/April 1998), calcium ions are often the missing element in a source water's ability to deposit lime scale.

When we dissolve gypsum into water that contains appreciable (100 mg/L or greater) amounts of bicarbonates and has a pH of 7.0 or greater, we are setting up a system to actively precipitate calcium carbonate (lime scale). When dealing with waters with high potential for lime scale formation (high total alkalinity), it may be more cost effective to seek methods of applying calcium to the vineyard other than through irrigation injection.

If the irrigation water has a high (>6.0) sodium adsorption ratio (SAR), you may need to supply calcium to the soil to keep sodic soils from developing. The product you use depends upon the pH of the soil, and whether or not there is any limestone (calcium carbonate) already present in the soil. If the soil is acidic, the addition of limestone will supply calcium and tend to raise the pH of the soil. If the soil is neutral or basic, the addition of gypsum (calcium sulfate) will supply the needed calcium with little effect on the soil pH.

Applying bands of gypsum to the soil beneath the emitters will be as effective as injecting the material into the water, without the plugging potential. Soil applications also have the advantage of using natural rainfall to carry calcium into the soil. If the soil contains limestone (also called "free lime"), then soil applications of elemental sulfur or sulfuric acid will react with the calcium carbonate to release calcium ions. Sulfur and sulfuric acid will lower the pH of the soil as well.

If the irrigation water is very low in total dissolved solids (TDS) or electroconductivity (EC), making water infiltration a problem, applying a band of gypsum underneath the emitters may be a better choice than injecting gypsum into the irrigation system. Another option is the use of "water penetrants" or "surfactants," which decrease the surface tension of the water, allowing for better infiltration. There are many products on the market formulated specifically for this application. Promoting cultural practices that increase the organic content of the soils will also help improve soil texture and water infiltration.

Another common occurrence on irrigated soils in the arid western U.S. is surface crusting beneath drip emitters. In many cases, this is caused by the formation of lime scale where evaporation causes the calcium salts in the water to concentrate beyond their solubility point, and calcium carbonate is deposited as a thin layer of concrete. Increasing the calcium content through the injection of gypsum will only make this situation worse. This surface scale can be removed by adding sulfuric acid through the irrigation water. Elemental sulfur may be added to the soil. The

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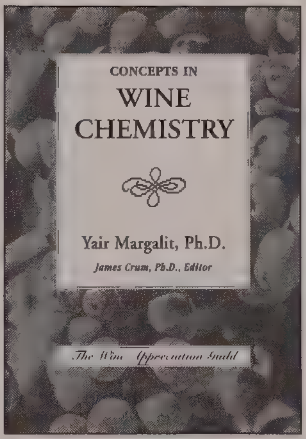

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microbial oxidation of soil sulfur by bacteria digests elemental sulfur, freeing hydrogen protons. The protons react with the calcium carbonate, forming carbon dioxide, water, and calcium ions.

How to avoid plugging

If the water source is high in bicarbonates and the pH is high (conditions which lead to lime scale precipitation), how do we avoid the potential plugging caused by chronic lime scale formation?

Gypsum may be injected without the worry of lime scale formation if the pH and the bicarbonate (often expressed as total alkalinity) levels of the water are low enough. If the natural water is too high in either of these two factors, it can be modified with the injection of sulfuric acid prior to the gypsum injection point, effectively reducing the total alkalinity and pH.

To determine how much acid you will need, obtain a valid water quality analysis from a reputable independent water laboratory. Before obtaining the sample, contact the lab and tell them

SOURCES OF CALCIUM

Calcium carbonate ($CaCO_3$), also called lime, is not soluble in water. It will tend to increase the pH of the water to above 8.0. Lime is what we attempt to remove from irrigation systems, and it is not an appropriate source of calcium for injection.

Calcium magnesium carbonate, dolomite lime, is not soluble in water. It is used to increase the soil pH where magnesium is also required. It is not an appropriate material for fertigation.

Calcium chloride ($CaCl_2$) is a very soluble source of calcium, but its use in agriculture is limited because of the chloride content.

Calcium ammonium nitrate is a mixture of the calcium and ammonium salts of the nitrate ion. It is commonly available as CAN-17, which contains 17% nitrogen by weight. This is an excellent source of nitrate nitrogen and calcium ions.

Calcium nitrate ($Ca(NO_3)_2$) is an excellent source of nutritional calcium and is extensively used in the hydroponics industry. It has good solubility, approximately 10 pounds per gallon (1,200 grams per liter), and is widely available. The pellets are almost always wax coated, and the wax must be skimmed off of the top of the solution in the mixing tank prior to injection.

Calcium polysulfide (lime sulfur) is an excellent source of calcium and soil sulfur, but it is not stable in neutral and acidic environments, precipitating out elemental sulfur. It is not recommended for use in micro irrigation systems.

Calcium sulfate ($CaSO_4$) or gypsum is a popular product for injecting into irrigation systems, which is surprising when one considers its extremely limited solubility, 0.02 pound per gallon (2.41 grams per liter). It is available in various grades, each having varying amounts of insoluble minerals.

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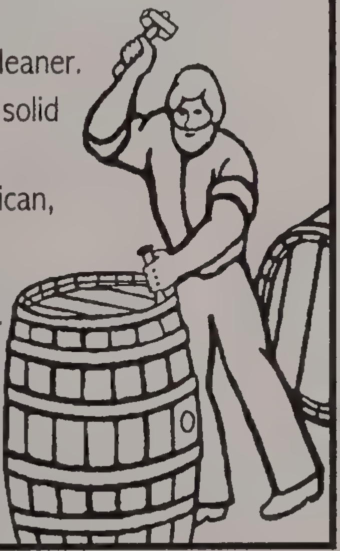

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that you want to know what quantity of gypsum you can add to the water before lime scale starts to precipitate. Also tell them how much gypsum you would *like* to add to the water. If you need to add enough gypsum to make lime scale precipitate, ask them to determine how much acid you need to add to prevent the lime scale from forming. They will be able to instruct you on how to sample and preserve the water, so their test will be valid. These analyses should be relatively inexpensive.

One alternative to acid injections is the use of "lime scale inhibitors." These compounds have been around for years in "spotless" dishwasher detergents and the steam-generating industry, and several have been registered for use in agricultural irrigation systems. Because of their cost effectiveness and inherent safety factors, lime scale inhibitors are becoming quite popular alternatives to acid injections.

Another potential plugging problem may be avoided by refraining from injecting phosphorus fertilizers into irrigation systems that have had gypsum injections until the mainlines and hose laterals have been completely flushed. The calcium remaining in the system can react with the phosphorus to form insoluble precipitates of calcium phosphate, which are very difficult to flush from the system.

Summary

Addition of soluble calcium to the vineyard has many agronomic benefits, but there is a high potential that adding calcium to the irrigation water will cause emitter-plugging lime scale to form, which will affect the uniformity of the water and nutrient applications. There are many viable alternatives to gypsum injections, and there are ways to modify the irrigation water to prevent lime scale formation during gypsum injections. Many vineyard managers are finding that soil applications every four or five years take less management time than irrigation applications, which require constantly dealing with gypsum machines and acid injectors. ■

Lizanne E. Wheeler and Patrick D. Brown are independent irrigation design consultants, specializing in developing bilingual training and management programs for micro-irrigation systems. They may be contacted through Vineyard Water Systems, 521 Lucerne Road, Cayucos, CA 93430, tel: 805/995-0587. Reprints of their recent publications are available at www.vineyardwater.com.

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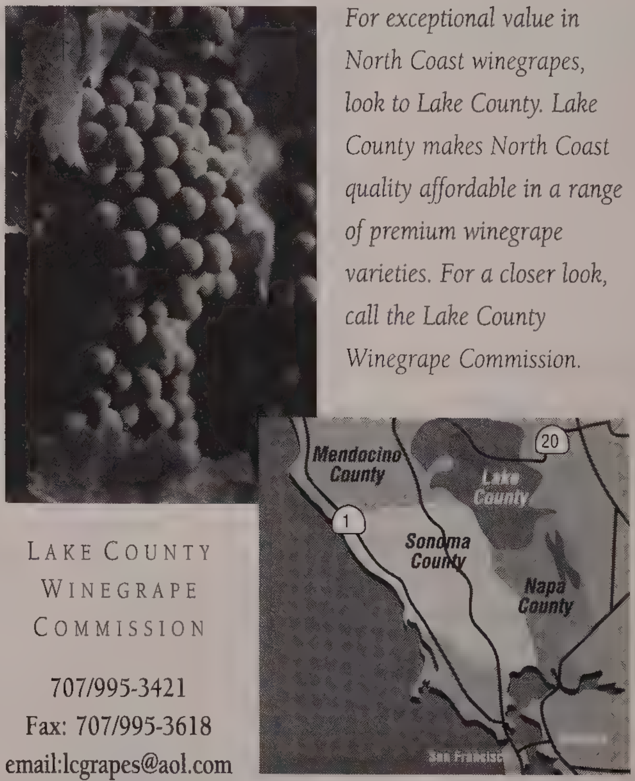

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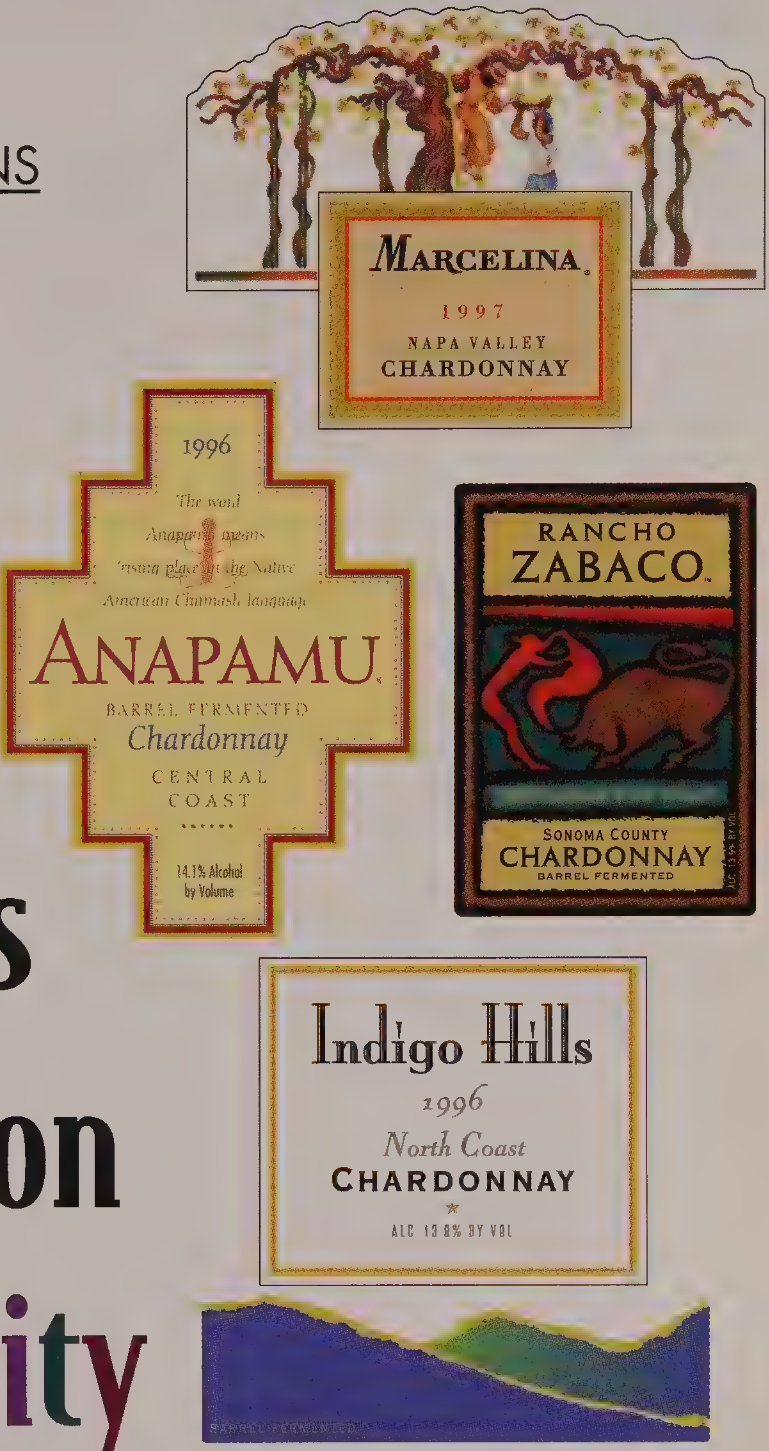
GRAPE ORIGINS

New Gallo brands focus on diversity

by Eleanor & Ray Heald



IN today's competitive marketplace, producers of super-premium wines have placed increased emphasis on region of origin. The French call it *terroir*, but wine marketers consider it another way to spell diversity.

Wines from a unique place offer consumers taste and style differentiation, but above all, a choice.

No other U.S. winery has the vineyard source breadth and depth of E&J Gallo. Capitalizing on this vineyard diversity over the last five years, Gallo has added to its signature wines and introduced new wine brands that showcase the unique character of several California growing regions.

Dave Magnasco and Brian Clements are Gallo's grower relations liaisons for the North Coast (Mendocino, Napa, and Sonoma Counties), who contract grapes from 250 growers and write planting contracts. They note that many of these growers, now in the third generation, have been delivering fruit to Gallo facilities for over 50 years.

Indigo Hills, Anapamu, Rancho Zabaco, and Marcelina are the brand names Gallo has chosen to reflect regions of origin. Several varietals are bottled under each of the brands, but *PWV*'s focus here is on Chardonnay and how each wine expresses its diverse regional identity.

Indigo Hills is a reference to the mountains of the coast range which appear blue-hued from Mendocino County at dusk. Mendocino is the principal grape source for Chardonnay bottled under the brand with Paso Robles supplying the Cabernet Sauvignon.

Anapamu translates "rising place" in the language of the Central Coast Chumash Indians, and Gallo's Anapamu Chardonnay comes mainly from Monterey County.

Rancho Zabaco is the name of an original Mexican land grant spanning Sonoma County's Dry Creek and Russian River valleys. Zabaco Chardonnay is made principally from Russian River fruit.

In addition to winemaking, Gallo has woven history into the Zabaco brand and uses it as part of its marketing in point of sale materials. With origins dating back to 1841, Rancho Zabaco was once called the frontier of Sonoma and became what is now known as northern Sonoma County.

The brand name Marcelina honors California's first female viticulturist Marcelina Dominguez. Marcelina Chardonnay is made principally from Napa Valley grapes.

Indigo Hills

The 1996 Indigo Hills Chardonnay is 87% Mendocino-grown grapes from a pool of 15 to 20 growers, augmented by 12% North Coast and 1% Central Coast grapes. About 40,000 cases of this wine were bottled, retailing nationally for $11 per bottle.

Overall, the wine is 82.2% Chardonnay, 9.7% Chenin Blanc, 5.8% French Colombard, and 2.3% mixed white varieties. Winemaker Marcello Monticelli notes that the acidity of the Mendocino Chardonnay was low in 1996, and the addition of Chenin Blanc and French Colombard raised it to acceptable levels for a TA of 0.60 at bottling.

All these wines were barrel fermented separately and blending tastings judged the best additions for the wine. The 1997 bottling is nearly all Mendocino Chardonnay.

"Since we're buying from the same growers, we believe low acidity in 1996 was a characteristic of the vintage," Monticelli says. "Over the last several years, our growers have changed trellises, are doing more leaf removal, and doing better irrigation, but some years ripe grapes with full flavors have low acids."

The wine was 100% barrel fermented, aged four months *sur lies*, stirred every two weeks in the first month and every three weeks thereafter. About 90% of the wine completed malolactic fermentation (MLF) after inoculation at the beginning of primary fermentation.

Gallo senior winemaster Dr. George Thoukis notes, "Because Mendocino is a cool climate, once the acidity is adjusted, we can easily taste citrus notes and pear-appley crispness. That's the character of Mendocino Chardonnay.

"The majority of the oak (82%) used was American, half being new, because we didn't want to overpower the gentle fruit. The French barrels were second fill. While the 1996 Indigo Hills Chardonnay does not have a particularly long finish, it is user friendly. You can enjoy more of it than the typical California Chardonnay, which shows heavy oak influences on the mid-palate, yet is frequently only medium-bodied.

"Of the four brand Chardonnays, Indigo Hills is the lightest. We're trying to give the consumer the expression of geographic locality. Mendocino Chardonnay is, in general, a lighter style Chardonnay that should have only minor intervention by a winemaker."

Magnasco observes that when Mendocino Chardonnay is picked, grape flavors dictate less oak. "With heavy emphasis on oak, the wine would be just an oak extract without fruit."

Anapamu

The 1996 Anapamu Chardonnay is labeled Central Coast. Though 95% of the fruit comes from Monterey, Gallo decided that Central Coast was a better marketing choice for region of origin. About 30,000 cases of this wine were produced, and it retails nationally for $14 per bottle.

Ken Wara (grower relations liaison) handles fruit from about 20 growers in the Central Coast and Monterey for Anapamu, but Gallo is expanding its vineyard potential in the region. In 1998, Gallo purchased 1,700 acres (Olsen Ranch on the Salinas Bench near Greenfield, CA). It was a cattle ranch, never under vine, but was surrounded by vineyards. About 700 acres will be planted to Pinot Noir and Chardonnay, beginning in spring 1999. Gallo's philosophy is to develop half or less of its new parcels for vineyards, leaving the remainder in a natural state to preserve the balance of nature and avoid creation of a monoculture. In the future, there will be a Gallo winery for fruit sourced in Monterey and further south in the Central Coast.

Big differences in soil conditions and climate make the Anapamu Chardonnay very different from Indigo Hills. As a result, the fruit leans more toward tropical elements and can handle 34% (half new) French oak, 66%

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"With this Chardonnay, we're trying to bring out rich, ripe, tropical aromas and flavors," Monticelli notes. "This is not only a characteristic of the Monterey grapes we receive, but of most cool climate Chardonnay from the Central Coast."

Because Monticelli again found acid levels too low for a bright finish, he corrected both juice and wine with tartaric acid additions. Bottling TA was 0.67 in a wine with 0.50% residual sugar.

Following uninoculated barrel fermentation in some heavy-toast cooperage, the wine was aged *sur lies* for nearly 10 months. Monticelli believes that the heavier toast adds appealing spicy elements, particularly in the finish. He also contends that Central Coast fruit takes to 100% MLF with addition of MLF bacteria at the beginning of primary fermentation, offering a full mouthfeel to a wine with a lingering, creamy finish.

For barrel ageing, Monticelli reports that experiments are continually done on a wide variety of oaks (American, French, and Hungarian) to choose the best barrels for wine from a given region.

MLF is encouraged in all the branded Chardonnays during alcoholic fermentation. Most lots receive low doses of MLF inoculum at the beginning of primary fermentation to properly integrate ML character and yet try not to interfere with alcoholic fermentation.

Rancho Zabaco

Zabaco Chardonnay showcases citrusy and appley qualities from 85% cool Russian River Valley sources, with ripe tropical fruit notes stemming from 15% northern Sonoma County grapes. The 1996 bottling is the first vintage with dominance of Russian River Valley Chardonnay grapes under the Rancho Zabaco brand. A good portion of the fruit came from Gallo's own Laguna Ranch.

"The mouthfeel is much fuller," says Monticelli. "We like to consider it our seductive Chardonnay with layers of flavors, complexity, opulence, and a long finish but excellent expression of fruit. You can't beat Russian River Valley Chardonnay for this style of wine."

About 15,000 cases were bottled, retailing nationally for $16 per bottle.

Magnasco describes Russian River Valley grower vineyards and Laguna Ranch as high Region I to low Region II with significant fog until late morning during the summer. Bloom to harvest in the region averages 95 days.

More winemaker intervention, such as extended lees contact, longer barrel ageing, and new American oak, makes Zabaco Chardonnay a bigger wine, and the lush fruit can handle the new oak, giving it a noticeably toastier finish. "Uppermost in our minds was not to lose the fruit in winemaking," Thoukis reports. "This is partly the reason for the 37% mostly used French barrels — to retain fruit character."

Continued on page 62.

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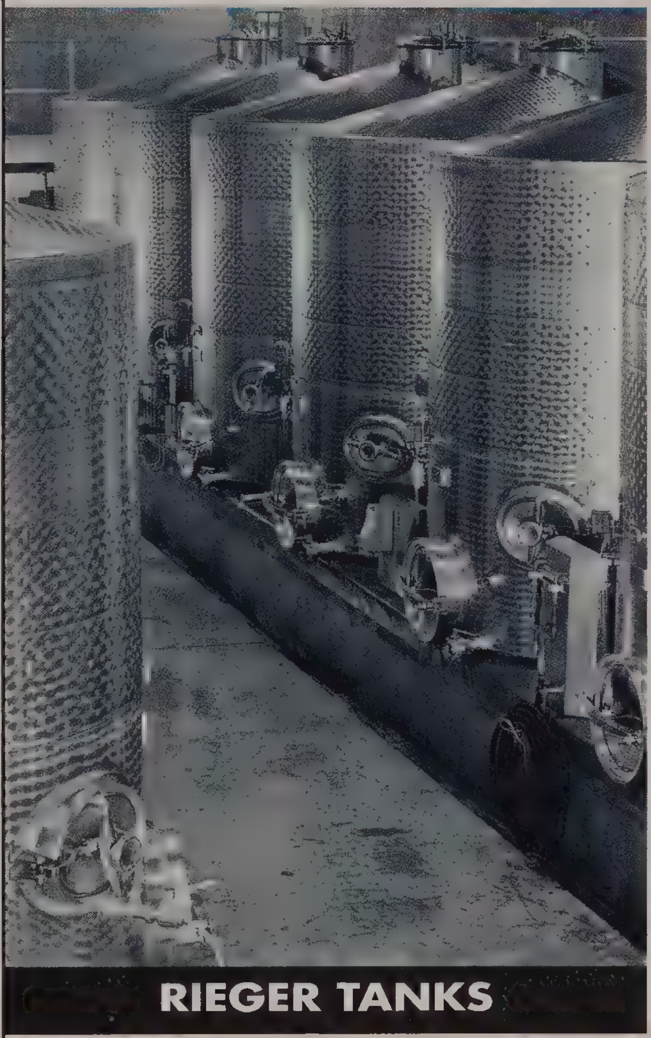

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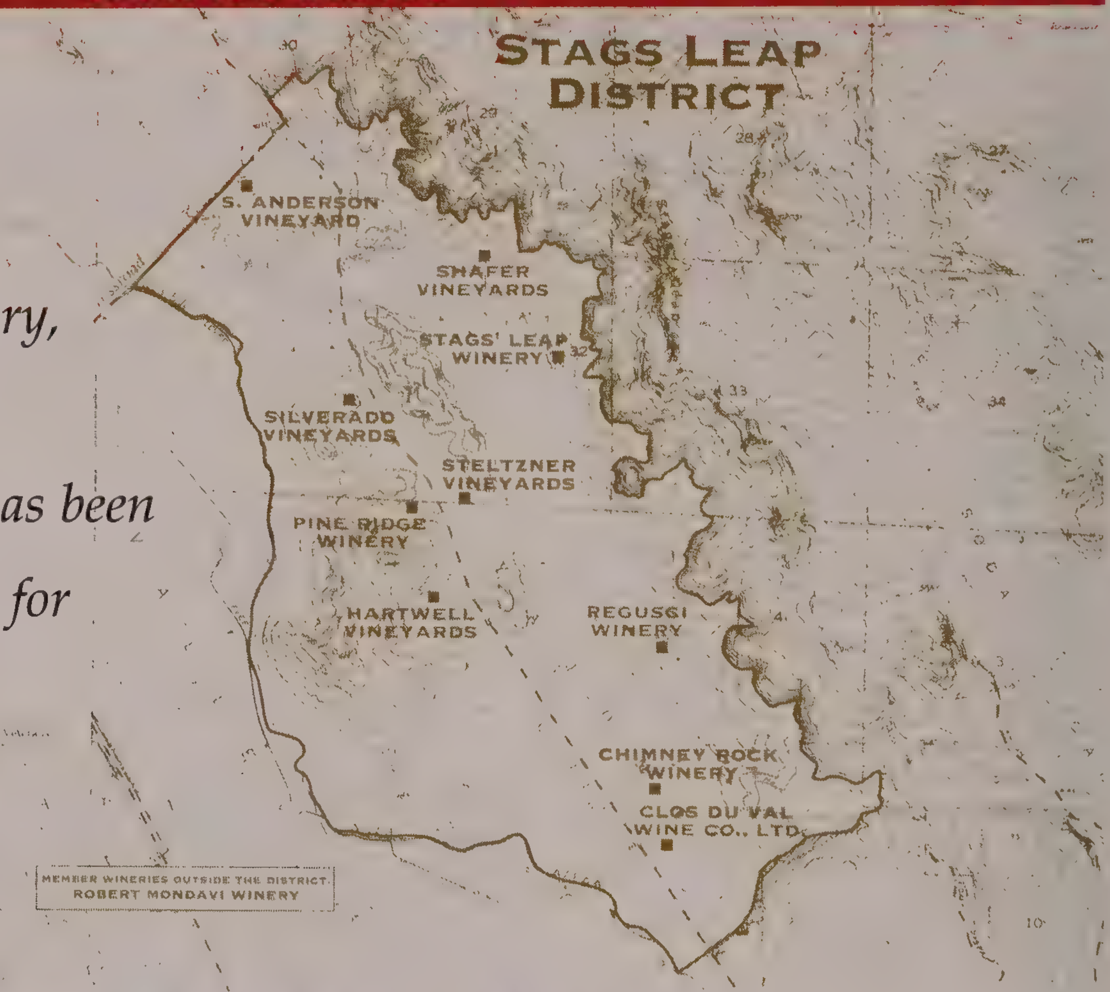

Growing distinctive Cabernet Sauvignon

by Eleanor & Ray Heald

PARTICIPATING PRODUCERS:

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David DeSante, winemaker
Richard Chambers, vineyard owner

Chimney Rock Winery, Napa, CA
Douglas Fletcher, winemaker

Clos du Val, Napa, CA
Bernard Portet, owner/winemaker

Hartwell Vineyards, Napa, CA
Celia Masyczek, winemaker

Robert Mondavi Winery, Oakville, CA
Richard Sowalsky, assistant winemaker

Pine Ridge Winery, Napa, CA
Stacy Clark, winemaker

Regusci Winery, Napa, CA
Jim Regusci, owner

Shafer Vineyards, Napa, CA
Doug Shafer, owner

Silverado Vineyards, Napa, CA
Elena Franceschi, enologist

Stags' Leap Winery, Napa, CA
Robert Brittan, winemaker

Steltzner Vineyards, Napa, CA
Charles Hendricks, winemaker

Stags Leap District (SLD) growers are pushing the envelope of modern viticultural techniques to preserve and enhance the recognized characters of their high-quality, regionally-expressive Cabernet Sauvignon. They strive to maximize every facet, including sites, soils, rootstocks, clonal selections, designer trellis systems, and water management regimes.

SLD producers have reason to extol their Cabernet Sauvignon with its pronounced cherry, blackberry, and black currant flavors and chocolate notes. The hallmark of SLD Cabernet Sauvignon is a beautiful mid-palate structure and an elegant finish with finesse.

PWV invited producers to discuss growing and winemaking of SLD-designated Cabernet Sauvignon in this exclusive varietal review.

SLD and terroir

Bounded by the towering Stags Leap palisades to the east, the Napa River to the west, Yountville Cross Road to the north, and low-lying flatlands to the south, the Stags Leap District is one mile wide and nearly three miles long. A valley within the Napa Valley, it was granted official recognition as a viticultural area in January 1989.

Of 1,200 plantable acres in the district, 940 acres are currently under vines; 72% of them are Cabernet Sauvignon and Merlot.

Within its borders, the SLD has a number of *terroir* factors which are common to all Cabernet Sauvignons produced there.

Bernard Portet (Clos du Val) notes, "So often when something has been written about SLD, soil has been used instead of the bigger and better term *terroir*. I don't understand why we shy away from this term when speaking about California.

"*Terroir* is recognized as the combination of soil and microclimate of a delimited area. Superimposed on this is the choice of rootstock and clonal selection for a given grape variety. You cannot dissociate any of these elements when speaking about an appellation."

Among these elements of *terroir*, soils have a significant impact on the character of SLD Cabernet Sauvignons. Eastern elevation soils are the result of volcanic eruptions 10 million years ago and the slow erosion of the Vaca Range. In the lowland area, Napa River sediment created a unique blend of bale loam with clay-like substructure. These gravely soils and those of the hillsides are coarser, retaining less water.

Soil reports from the University of California-Davis (UCD) indicate that no other Napa Valley floor soils are similar to those of SLD.

The microclimate of the district is also unique. Rock facades of the palisades to the east reflect the sun's heat onto vineyards below, causing temperatures to rise more quickly here than in neighboring vineyards. In late afternoon, hills funnel in cool marine air, flowing north from the San Pablo Bay through the SLD corridor.

Cooling effects of this air flow, coupled with nighttime air drainage off the mountains and hillsides, translate into lower nighttime temperatures and extend the SLD growing season. Cooling effects afford longer hang time, retaining acid/sugar balance while maturing phenolic compounds.

A sense of place

"There are some great spots in Napa Valley for Cabernet Sauvignon," says Doug Shafer (Shafer Vineyard). "SLD is one of them. SLD is on the edge; about as far south as you can grow Cabernet Sauvignon in Napa Valley. South of the SLD, Cabernet Sauvignon can be grown, but without the distinction of being a stand alone wine. The trick is that SLD is on the east side of Napa Valley where it benefits from afternoon sun."

In Charles Hendricks' (Steltzner Vineyards) opinion, the designation Napa Valley is somewhat generic. "As producers, we stand shoulder to shoulder touting the great qualities of Napa Valley in general. But by creating subappellations, it gives the wines a specific sense of place, a uniqueness not encountered elsewhere. To me, however, topography is more important to SLD than soil type."

Doug Fletcher (Chimney Rock Winery) points to the dramatic difference in degree days between Carneros (3,978) and Calistoga (4,778), the southern and northern limits of Napa Valley, with 4,274 for SLD. "It's not surprising that in replantings," notes Fletcher, "we see Bordeaux varieties in very special microclimates, where they were not planted before.

"In 1989, when Deborah Elliott-Fisk (UC Davis) evaluated soils from 20 SLD Cabernet Sauvignon vineyards and 30 vineyards spanning 100 soils throughout Napa Valley, she did not attribute any elements unique to the wines stemming exclusively from soils."

Rootstocks and sites

Fletcher believes that in recent replanting, growers and wineries are addressing more aspects of *terroir,* such as rootstocks, and he notes how the application of rootstocks within the SLD and Napa Valley has been fine tuned. For example, one of Chimney Rock's vineyards has two different rootstocks, according to Fletcher. The soil in one block lacks potassium ion (K^+), and 4453 rootstock that allows more K^+ uptake has been planted there. In the other block, 101-14 was chosen. The goal is to use the rootstock to heighten the similarity between fruit from both blocks.

In the same way, depending on soil profiles, Portet has used 420A, 101-14, 140R (Ruggeri), and 1103P (Paulsen) in replantings.

Richard Sowalsky (Robert Mondavi Winery) notes that it has been Mondavi's objective to plant rootstocks to achieve the ultimate potential together with uniformity across vineyard blocks, without eliminating differences among them. Such planning enhances all other aspects of *terroir*.

Pine Ridge Winery's SLD parcel has multiple hillside exposures. In early replantings, 110R and 1103P were used on the uppermost sections where soils are volcanic and stressed. Current assessment is that both these choices were too vigorous, and now devigorating 101-14 and 3309 are preferred with closer spacing and a water management program, according to Stacy Clark.

Citing their experience, other producers consider 420A as most devigorating, but their observations are challenged by Rob Brittan (Stags' Leap Winery). "Clone 420A is a slow starter," he maintains, "but it takes off."

In any discussion of rootstocks, fertigation and water management regimes make a significant difference in vine behavior. "I don't think we can put a tag on the performance of any one rootstock, except how it behaves in a particular location," contends Portet.

Richard Chambers adds, "I've come to believe that Cabernet Sauvignon is so disciplined that it sets well and produces consistent yields no matter what rootstock it's on." He also considers St. George a good rootstock for Cabernet Sauvignon. "It is not too vigorous for hillsides, and it's quite drought resistant."

Brittan queries whether crop loads are more variable on St. George. "Not with Cabernet Sauvignon," Chambers answers.

"What must also be considered is a rootstock's vegetative cycle. For example, St. George allows a longer growing season than 101-14. That's an advantage in obtaining long hang time for Cabernet Sauvignon, and when included in a rootstock mix, it offers another dimension of difference."

Celia Masyczek (Hartwell Vineyards) questions whether this is truly a rootstock difference and not a soil difference. "In my soils, it's a rootstock difference," Chambers replies. "I have them growing right next to one another in the same soil type."

Jim Regusci suggests that trying to identify soil types and to match appropriate rootstocks is an ideal that can be accomplished in a small two-acre vineyard. He asserts that what is critical for a larger vineyard of 10 to 50 acres is water management in different blocks. He notes that in 1998, when there was excess water in the soil, vines on 110R were out of control. Regusci's goal is to keep both growth and ripening even in the same vineyard. "Since the failure of the catch-all rootstock AxR-1, it's a whole new ballgame," Hendricks concludes. "Today, in a replant era, we're all planting grid blocks of different clones and rootstocks to learn the best combination. It's a fun time because nobody has a true clue about what's really going to do best.

"We're all trying to make the best combination. In wet soils, 420A can't be planted because it doesn't like wet feet. You don't want a tap root, so the choices are 3309 or 101-14, which can handle wet soils.

"If you need to dig deep for water, 140R is a likely choice along with a rootstock of Rupestris parentage. If shortening the vegetative cycle is desired, increasing the amount of Riparia influence in the rootstock is beneficial. With bale loam over hardpan, a tap root is not desirable, so 1103P is the way to go. We're making best guesses, and today, there are no absolutes for which rootstock to use where."

Other Bordeaux varietals

Along with Cabernet Sauvignon, SLD producers grow other Bordeaux varietals. Hendricks indicates that the best sites for Cabernet Sauvignon are well-drained soils with the best sun exposure. Because Cabernet Sauvignon has a much longer vegetative cycle, it needs more sunlight and heat days than Merlot.

Also, Merlot is planted on deeper soils where Cabernet Sauvignon does not do well. Cabernet Sauvignon's structure and color seem to be diluted when planted in deeper soils.

Water management closer to harvest is another important difference between the two. To concentrate fruit, Cabernet Sauvignon needs to be stressed, which requires the most well-drained blocks. "Water has been the great equalizer of modern-day viticulture," Hendricks contends.

Blending

Sowalsky notes that of all Robert Mondavi Cabernet Sauvignon blends, SLD has the smallest blending fraction of other varietals. SLD Cabernet Sauvignon fruit speaks clearly, and the other Bordeaux varieties don't currently contribute much to the blends. As an example, he points to Oakville District Cabernet Sauvignon: the Merlot from the To-Kalon Vineyard helps round out the wine and makes it lusher and more voluptuous. That's not the case with SLD, which is generally 5% or less blending varietals.

Pine Ridge, on the other hand, blends with small quantities of Bordeaux varietals grown in the SLD. "I agree with the Mondavi thought as far as Cabernet Sauvignon," Clark says, "but Pine Ridge is not blending out of necessity. The addition of other Bordeaux varietals makes a more complete wine. Percentages vary with the vintage."

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some years, but more often, use a small percentage of Bordeaux varietals in the blend.

"Cabernet Sauvignon is king of the red grapes," Charles Hendricks maintains. "It provides durability, structure, and the meat of the wine. I have learned that the body of Cabernet Sauvignon is nicely fleshed out by the interaction with Merlot and Cabernet Franc. Both take the edges off Cabernet Sauvignon in creating a more round and full wine."

Shafer believes that it's not so much a matter of whether the wine is 100% Cabernet Sauvignon or a blend. "What's important is the fact that 85% or more of the grapes are from the SLD, and all have a similar phenolic structure. Some of the flavors of wines from the various producers in the SLD may be different because of blending practices, but the package is the similarity. That's the critical part of the discussion."

Brittan notes that he blends with Merlot for structure, not for taking edges off Cabernet Sauvignon. Petit Verdot generally makes it into the blend every year; Cabernet Franc may or may not.

David DeSante (S. Anderson winemaker) sums up, explaining, "The goal is to make the best wine. If that means using Bordeaux blending varietals, then that choice meets the stated goal."

Training and trellising

Winemakers view training and trellising as another tool to enhance fruit quality. Because they can only estimate how many leaves a root system will support, spacing may be either too close or too far apart.

Chambers believes that SLD producers are just learning the ramifications of different trellises. He's trying different systems in individual areas as he's replanting phylloxerated vineyards.

Previously, Chambers had all vines on a two-wire vertical "T" trellis with California sprawl, but he's converted to different orientations of lyre and is using Smart-Dyson for Cabernet Sauvignon and Cabernet Franc. He's used Smart-Dyson in an area where Cabernet Sauvignon had not grown successfully but believes he is now getting proper sun exposure with an orientation that is vine shaded from 1:00 to 2:00 PM. There's great soil variation, and Smart-Dyson allows better vine balancing when used in conjunction with sound water man-

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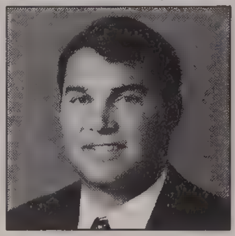
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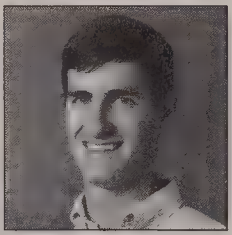
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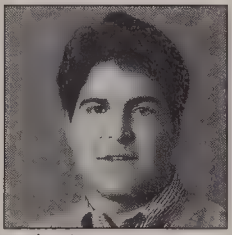
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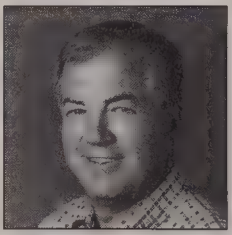
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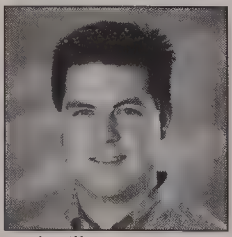

Brad Miller

agement practices.

On southern and western exposure terraces where shade is needed, Chambers intends to stay with California sprawl. On lower sites without extreme heat problems and sun exposures, the newer trellis designs appear to be working favorably.

Chambers enjoys working in a vineyard with multiple variations. "I don't farm to make grapes the same," he emphasizes. "I put Cabernet Sauvignon in multiple locations because I want different qualities and a great array of Cabernet Sauvignon complexities. I accentuate the differences based on site, water availability, trellising, sun exposure, and then by maturities."

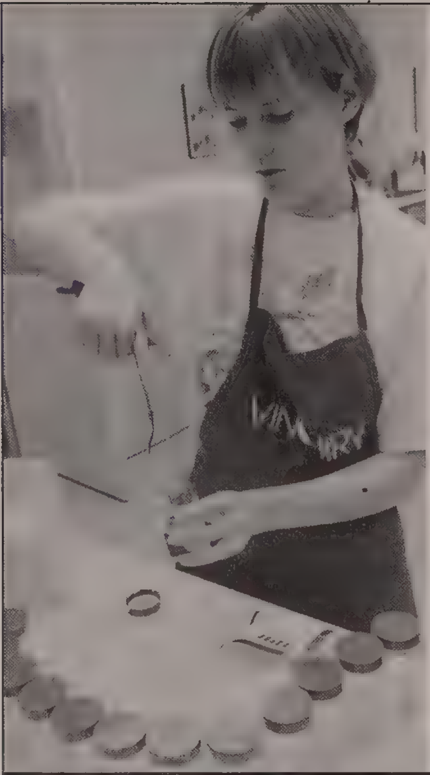
Even though Chambers uses the same farming techniques for Merlot, he notes that they are less important because weather extremes outweigh any variations in management. Cabernet Franc tends to perform more like Cabernet Sauvignon under his farming regimen.

Regusci, who retains only about 15% to 20% of the SLD fruit he grows, has seen winemakers focus more attention on desired flavors before harvesting Cabernet Sauvignon. "The Brix reference point has changed," he reports. "It used to be that when sugar levels reached 22.5° to 23° Brix, grapes were picked. The biggest component today is fruit flavors with minimal consideration of Brix."

Clones and selections

Unlike his colleagues, Chambers believes there is a big difference in Cabernet Sauvignon clones. The majority of his plantings are UCD clones 7 and 8, but he has tried both Clone 15 (a Bordeaux clone preferred in southern France) and Bordeaux Clone 337 and finds them all quite different. He has Clone 15 planted in a warm site on a Smart-Dyson trellis and reports it has more tannin structure than Clone 337 in a similar environment.

"I think we need to be very careful about what we say about clones," Fletcher cautions. "It is very difficult to make sure, when you compare two clones, that in fact, they have been grown similarly." As an example, he cites his own experience with Merlot Clone 1. On a traditional T-trellis, it had big berries and low color and didn't ripen well. When the trellis was changed



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to a lyre, berry size decreased, fruit aromas rose, and ripeness was obtained. "I believe that if I put two wines in front of you, one from the old trellis and one from the lyre, I could convince you that these were different clones," Fletcher contends.

Regusci notes that there is also a problem of compatibility of clonal selections and rootstock, which can change how the clone performs. This is particularly true with 3309, which he says is only successful if the scion wood is clean.

Hendricks asserts, "The importance of site outweighs clone tenfold. As winemakers, we're always trying to increase the lushness, fruit dynamics, body, color, and other visible enhancements of a wine. The truth is, there's not been availability of choices. In a marketplace which revolves around choice, marketability of clones, and potential increase in quality, there has been a lack of available disease-free material to test."

Brittan adds, "The industry has been quite myopic when it comes to plant material selection. We are all at fault. We've been too complacent. Everyone is currently worshipping at the clone-337 altar, but I've stopped planting it because it grows too damn many grapes to make balanced vines possible. Bordeaux producers like it because it's very dependable, high-yielding, and early-ripening. Just what they need to get fruit in before their autumn rains."

Fletcher adds that California producers need to be very careful about using French selections in a totally different situation. The French are looking for vines that ripen early, we should be looking for vines that accumulate sugar slowly.

Brittan points to Robert Mondavi's To-Kalon Vineyard in Oakville, which he considers to be a model for Cabernet Sauvignon. He wonders, if the planting techniques of To-Kalon were transferred to the SLD, would the similarities between the Oakville District and SLD Cabernet Sauvignon be dramatic.

Sowalsky answers, "No way! You can't extrapolate. It's a different place. This goes back to the whole *terroir* issue. To-Kalon has its own degree days and exposures. There's a great diversity in soil types, much different from SLD.

"Mondavi takes a balanced approach to viticulture on all blocks. It's difficult to propose 'what ifs.' Sure, we could take To-Kalon plant material to SLD, but then we would balance it in every way we could to the new situation and site."

Brittan inquires whether any SLD producer has explored the origins of early plant material from which early SLD Cabernet Sauvignon was made and particularly asks if Silverado Vineyards knows the origins of the Henry See Cabernet Sauvignon selection.

Elena Franceschi (Silverado Vineyards) responds that the best the winery has been able to establish is the original cuttings came from Sterling's Bear Flat Vineyard. The cuttings in Sterling's vineyard came from Wente in Monterey County. Silverado has planted field selections from See Cabernet Sauvignon in other vineyards, and the one in SLD is completely different.

A work in progress

In 1976, a turning point in recognition of the quality of SLD Cabernet Sauvignon occurred. At the now famous blind tasting held in Paris, nine French judges awarded a SLD Cabernet Sauvignon first place. The 1973 Stag's Leap Wine Cellars Cabernet Sauvignon bested the likes of Chateau Mouton-Rothschild and Chateau Haut-Brion.

Impact of this event was reinforced 10 years later when the same wines were tasted again. This time, the winner was another SLD wine — the 1972 Clos du Val Cabernet Sauvignon.

First flush of early international successes are over, and SLD producers have moved into a new era. Phylloxera has necessitated replanting of SLD vineyards, and history is in the making.

SLD wine producers are convinced that despite their best guesses on which clonal selections, rootstocks, trellis systems, and water management regimes to use, it is SLD *terroir* that continues to establish the uniqueness of their Cabernet Sauvignon. ■

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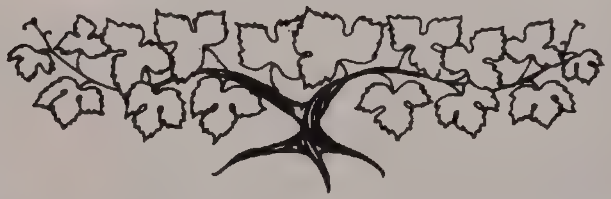

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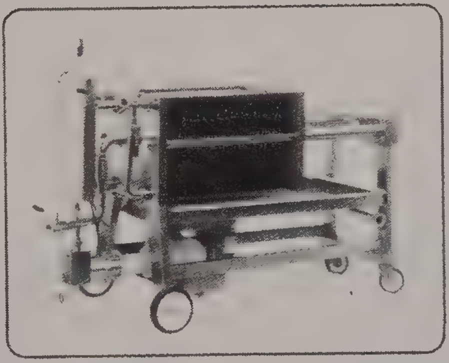

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PART I

BALANCING Yield and Quality

by Jordan Ross

Are vineyard yield and wine quality inversely related? This assumption is deeply ingrained. No one would suggest that yield and quality are not related, but the experiences of top producers in Bordeaux, Burgundy, California, and Oregon show how complex the subject is and how misleading generalizations can be.

The truth is lower yields, old vines, and non-irrigated vineyards may not produce better wine. In fact, during the last decade, the highest quality wines of Bordeaux and Burgundy have come from the highest yielding vintages, and the worst wines have come from the lowest yielding vintages.

The Stag's Leap Wine Cellars Cabernet Sauvignon that won the 1976 blind tasting in Paris was produced from the vineyard's first crop. Old vines do produce lower yields, but the quality is not necessarily better, and by reducing vine stress, irrigation (rain in Bordeaux and Burgundy) is indispensable to what are acknowledged to be some of the world's great wines.

Talk about low yields does sell wine. Dominique Lafon (Domaine des Comtes Lafon in Meursault) believes growers in Burgundy feed wine writers this misleading information in order to sell their wine. He adds that wine writers are also to blame for perpetuating these notions; "Growers like to talk to journalists about low yields, and journalists like to hear things like this.

"The wine writers all know how to taste wine, but when they get into techniques, they don't know enough about it. To look at a vineyard, your eyes have to be trained for that, but who among the journalists know about vineyards and viticulture? Some producers here are talking low yields, but with so many dead vines in their vineyards it's nonsense, it means nothing."

Jean-Michel Cazes, owner of Lynch-Bages in Pauillac concurs, "It makes me crazy when I see people just looking at one statistic — the number of hectoliters per hectare — without looking into the planting density and condition of the vineyard."

Examining the factors affecting yield and quality — growing region, vineyard site, vine density, clone, grape variety, pruning, crop thinning, and complexity of the relationships between all of these factors — will demystify some of the long-held assumptions and demonstrate how generalizations about yield and quality can be misleading.

Pruning (shoots per vine)

Pruning establishes the number of buds retained per vine. Because buds produce shoots on which the clusters are born, the greater the number of buds per vine, the greater the potential yield. (The actual yield will depend on flowering, berry set, and crop thinning and other techniques.) Proper pruning creates a balance between the vine's vegetative vigor and crop level.

Vegetative vigor varies with variety, clone, rootstock, and soil, and if this vigor is not matched (balanced) with a proper crop level, the result is a vine which is either undercropped or overcropped and poor quality. If pruning is not severe enough, too many buds are retained, and with a vigorous variety, such as Sauvignon Blanc or Cabernet Sauvignon planted on a deep, fertile soil, the vine is thrown out of balance. As a result, the vine is overcropped, which stresses it and causes weak growth and incomplete ripening.

If pruning is too severe, the result is equally detrimental to quality, because the reduced number of clusters concentrates the vine's energy into fewer shoots. This overly vegetative condition creates a dense canopy, closing it off to both light and air circulation, causing shading and poor ripening.

These improper pruning decisions not only affect the quality of the current season's crop, but they also affect the quality of next year's harvest by affecting "bud fruitfulness."

Bud fruitfulness (clusters per vine)

The buds that are retained at pruning in winter produce shoots. These shoots produce more or fewer clusters depending on the amount of direct sunlight and heat the buds received during the previous spring. During that time, the microscopic grape clusters (flower clusters at that point) are being formed in the minute, developing bud. High temperatures and abundant direct sunlight — normal conditions in California — favor clusters and higher yields. Lower temperatures and cloud cover — more common to Bordeaux and Burgundy — diminish fruitfulness and yields.

Andy Bledsoe, vice president of winegrowing at Robert Mondavi Winery Company (Oakville, CA), recalls the influence these factors had on the 1995, 1996, and 1997 vintages: "The spring of 1995 was significantly cooler and cloudier than normal. Vines in some regions of California did not get enough light and heat to encourage the vines to develop clusters the following year. Because fruitfulness was very poor, the cluster count was very low the following year (1996).

"Wine writers mistakenly attributed the low yield in 1996 to poor set. It did rain in some areas during bloom which caused a poor set in those areas. By contrast, the spring of 1996 was excellent — a lot of sun and warm temperatures. We guessed that the fruitfulness would be very good in 1997, and we were right." The cluster count was very good, and yields were correspondingly higher.

The Mondavi vertical trellis system and management practices, such as leaf pulling and shoot positioning, promote fruitfulness by maximizing sunlight exposure onto the buds. The same results are achieved by more elaborate trellises on high vigor sites, which open up the canopy by dividing it in two to maximize light penetration.

Factors such as excessive irrigation or fertilization or choosing the wrong combination of rootstock, variety, or clone will also result in an overly vegetative vine and diminish bud fruitfulness, yield, and grape quality. A low vigor site, combined with a vertical trellis and leaf pulling, opens up the canopy maximizing sunlight exposure and therefore fruitfulness (in addition to improving air circulation and preventing rot).

Flowering (potential berries per cluster)

Flowering or bloom occurs in April or May in California and in June in Bordeaux and Burgundy. In sections of a vineyard where the soil warms more rapidly due to more favorable sun exposure, vines will bloom earlier.

Cooler weather delays flowering and can be detrimental to quality as Burgundy grower Etienne Grivot notes: "In the 1995 vintage, we had a proportion of bad grapes. The flowering took place over a three week period which was not absolutely perfect. The first grapes to flower were perfect at harvest, but the later grapes, maybe 5% to 6% of them, were not mature and we had to cut them off."

Fruit set (actual berries per cluster)

Fruit set occurs when a pollen grain fertilizes an individual flower, and the grape berry starts to grow. Usually only 20% to 30% of the flowers on a cluster set, the exact percentage determines the berries per cluster. (There may be up to 1,000 flowers in a cluster.) Set is delayed by excessively low or high temperatures (water stress), rain, or high humidity. Poor berry set (*coulure* in French) not only decreases yield but affects quality by preventing uniform ripeness within a cluster at harvest.

Crop thinning and overcropping

When a vine is carrying more fruit than it is able to ripen, it is overcropped. Green harvesting or crop thinning is the removal of excess grape clusters to insure that those remaining clusters will fully ripen. Chris Howell, Cain Vineyard & Winery (St. Helena, CA) winemaker explains, "Anyone who works in vineyards is familiar with situations where the vine is visibly overcropped; there are all these grapes hanging out there, and you don't see that many leaves. Such fruit is never going to have any intensity."

Growers usually err on the side of leaving more crop on the vine. If too much fruit sets, due to good fruitfulness, flowering, and set, the crop can be reduced so that the vine is carrying a crop it can ripen before fall weather sets in.

Christian Moueix, who started crop thinning at Chateau Petrus in 1973 comments, "We need to crop thin in Bordeaux. Of course, when we crop thin (usually in July), we don't know what

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the weather will be like in August and September. We have only a feeling and a weather pattern by that time, and we adapt the level of crop thinning to the feeling of the vintage. If we are in a rainy year, we thin more severely, if we are in a hot year we crop thin a little less severely."

Paul Pontallier, technical director at Chateau Margaux, explains that crop thinning in Bordeaux is a recent practice. "We at Margaux were the first to crop thin in the Medoc in 1986. We had the experience of Petrus doing it for a few years. We try to keep our yield reasonably low, because we never know if the conditions are going to be good or not."

Jean-Michel Cazes outlines yield guidelines at Lynch Bages: "We try to get 50 hectoliters per hectare (h/h) with a plantation density of at least 8,500 vines per hectare, which is our normal density in Pauillac and Saint Estephe. We look at the parcels before the harvest, and when we see that yields might go over that limit, we discard the excess grapes. We try to green harvest at veraison, so we can see which clusters are riper than others and remove clusters that are still green."

Bruno Prats from Chateau Cos D'Estournel in Staint Estephe practices green harvesting only on young vines (between 10 to 20 years of age), "while their vigor is a little too strong," he says. "It is a substitute when you have vines which are too vigorous and you want to artificially reduce the yield, but it's like pushing the gas pedal and the brake at the same time. It's better not to use the brake and put in a little less gas." He adds that, to really achieve quality, "you must have a naturally low yield (50 to 55 hectolitres per hectare with a density of 10,000 vines per hectare). We don't have to crop thin on the old vines, which normally produce low yields."

In California, Ridge Vineyard's high altitude (1,400 to 2,600 ft. elevation) Monte Bello vineyard in the Santa Cruz Mountains where Bordeaux varieties are grown is faced with such potentially harsh spring weather that thinning is mandatory. "During flowering and set in at least one year out of three, the weather is so difficult that we must start with more buds and plan to thin if nature does not thin for us," explains winegrower Paul Draper. "If not, yields can often fall below 1.5 tons per acre (20h/h) and adversely affect quality.

"In 1997, with good spring weather and a huge set, we dropped 30% of the crop on the Monte Bello vineyard and ended up with three tons/acre (40hl/h) and superb quality. We are quite traditional in vineyard and winery practice; however, we feel that balancing the crop to the vine and to the conditions of the vintage is an essential part of the role of the vintner as guide rather than maker."

The experience of David Gates, vineyard manager at Ridge with their Sonoma vineyards, provides a compelling argument for drastic crop thinning and how it can be variety-specific. Since younger Zinfandel vines tend to produce larger berries, carrying many more clusters causes the individual berries to remain small, which improves quality. The excess clusters are then thinned at veraison, and the remaining fruit has an intensity that is more likely to be selected for one of the Ridge vineyard designated Zinfandels.

In Burgundy, green harvesting is not a standard practice. While Domaine Dujac has practiced it at veraison since 1989, Domaine Roumier, Domaine Grivot, and Comtes de Lafon crop thin only occasionally. Christophe Roumier (Domaine Roumier) comments, "We green harvested in 1996, the last time before was in the young vines in 1992 and before that in 1986. We green harvest only in the young vines because the old vines don't need it. The people who are green harvesting every year have young vines, and they have no choice if they want to keep their quality."

Etienne Grivot (Domaine Grivot) states, "I don't like to green harvest. If you have to remove a proportion of the green grapes, you have to understand why the quantity is too big. If you cut off 20% green grapes, you don't obtain 20% less fruit overall, just maybe 10% less [because berries are bigger]. So it means that you have less skin and more juice and you obtain the opposite — a kind of dilution. If the vineyard is too vigorous, it is normal to obtain too much fruit."

Green harvest controversies

There is controversy about green harvesting: Should it be done? When should it be done? Does it make berries get bigger in compensation, as Grivot suggests? Dr. Nick Dokoozlian, viticulturist in the UC Davis Department of Viticulture & Enology, contends that berries normally don't get bigger if thinning is done at veraison.

"Thinning at veraison normally does not produce the effect Grivot indicates," says Dokoozlian. "You don't affect the crop based on berry size. If you thin at

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veraison, it is too late for the vine to compensate through berry size. If you thin too early, however, you will get compensation because cell division in the berries is still occurring." Thinning at veraison is still an imperfect solution to the problem of overcropping, since the discarded cluster represents a waste of the vine's energy.

Lafon is direct about his views: "When I hear people talk about green harvest it makes me laugh. It's so stupid to me — it's just like saying to everybody that they have selected the wrong rootstock, the wrong clone, they have used too much fertilizer, and maybe they have the wrong pruning, so they have too much crop.

"It's just that they have accumulated too many mistakes all the way through, and the only thing they can do is green harvest. I see it here, a lot of my clients say, 'You must be doing green harvest,' but I don't. If I have to do it, I start to think and get back to viticulture to avoid it. You might have one small mistake in one vineyard, but if all your vineyards are like this, you are really doing things wrong.

"I think you also have to accept that some vintages are more generous than others, and if you have done everything right from the start, then you can take a bigger crop and make very good wines," concludes Lafon.

Lafon's outlook may seem idealistic to some growers in California who rely on crop thinning to compensate for the fact that rootstock and clone are not correctly matched to the site. Many California vineyards were originally planted according to research done at UC Davis, which was funded by large wineries to develop the Central Valley. At that time, the mindset for low yields wasn't there. AxR-1 was chosen because it was easy to grow and to graft, typically with high yielding clones.

Francis Mahoney, owner of Carneros Creek Winery, says, "You don't want to put a high-yielding clone on ground that has very shallow top soil. Because in the springtime when there is plenty of moisture and sunshine, you're going to set a big crop but the ground won't be able to bring it along. So you end up dropping the crop. You have to create harmony between the soil and the vine, not too much, not too little, but just the right balance of fruit."

Lafon suggests that green harvesting is looked upon by some growers as an insurance policy: "A lot of people, when they prepare and work the vineyard, regard green harvest as good insurance. You put 80 to 90 h/h every year on your vineyards. Then if you crop thin to 50 h/h, for example, every year you are sure that you will yield 50h/h.

"But if you do everything right to harvest 50h/h, then if there is frost or bad flowering, you might go down to 25h/h. There are a lot of growers who just won't accept going down to 25h/h. It's a question of money. When you lose half the crop at flowering, it's not fun in a financial way. From year to year, some of my vineyards move from 20h/h to 50h/h. For whites we take 50h/h when it all goes well, and we are not going to crop thin. For reds, the maximum we will harvest is 40h/h."

Although there is a lack of consensus regarding crop thinning, there is agreement that overcropping dilutes flavor intensity and the consequences extend to the following year. The excess crop exhausts the vine by depleting its stored energy reserves, causing sluggish growth the following spring, which leads to reduced fruitfulness, excessive vegetative growth, shading of clusters, delayed maturity, and poor fruit quality. But there is no exact point when overcropping begins.

"I don't think that there is anyone, anywhere who denies the fact that if you overcrop a vine it will affect wine quality," remarks Steve Hill who farms 250 acres of Durrell Ranch in Sonoma. "The question is, where does overcropping begin? At what point do you begin to affect wine quality."

Nonetheless, the temptation is strong in California to hang extra crop due to grape shortages resulting from two successive short crops (1995 and 1996), replantings due to phylloxera, and the sustained high demand for top quality California wine. Justin Meyer, partner in Silver Oak Cellars (Oakville, CA) notes, "A lot of people are pushing their vines hard now because it's a high demand/high price time, and they figure that now is the time to get rich. But you can push vines over the edge. I don't care if you have twice as much fruit if it's half as attractive."

Since the grapegrowing business has become a seller's market, some Calif-

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ornia winemakers who buy grapes on the open market are protecting themselves against the potential for overcropping by entering into acreage contracts. For example, if Cabernet Sauvignon costs $2,000 per ton from a vineyard in which the grower usually produces five tons per acre, the winemaker contracts to pay $10,000 per acre while instructing the grower to limit yields to whatever crop level the winemaker feels is necessary to produce the best wine.

California's first modern acreage contract was in 1993 when Ted Lemon of Littorai Wines produced a vineyard designated Pinot Noir called "One Acre." Lemon explains his motivation for creating the acreage contract, "I wanted to underline that yield containment and detailed, timely husbandry were the future — not only for California in general, but especially Anderson Valley, a cool climate where soils can nevertheless support yields of four to five tons per acre — that the diluted, simple Pinot Noir that had come out of Anderson Valley resulted from a lack of viticultural input."

Does overcropping exist in Bordeaux? "In Bordeaux," responds Pontallier, "our Appellation Controllee system has fixed limits for production because we know from very, very old experience that overcropping is bad for quality — even if the level of the crop is not easy to fix. But in order to protect the quality of our winegrowing areas, we have yield limits for each. In other winegrowing areas where there is no limitation, people have a natural tendency — if they have a good market — to produce more wine, which we cannot do."

In Burgundy, the incentive to overproduce has always existed due to the historically high demand for limited quantities of wine. Unfortunately, of all grapes, Pinot Noir suffers most from overproduction in a climate where the penalties are so severe.

"There was a period where Burgundy overcropped, no doubt," comments Jacques Seysses of Domaine Dujac. "One should remember that in the 1950s, a grower in Burgundy was having difficulty making a living with his production. The trend at that time was to replant a selection that would produce more, so that the grower's family could live better. That selection didn't lead to quality. As these vines got older they made better wine, but it is not the same as if the selection was good in the beginning."

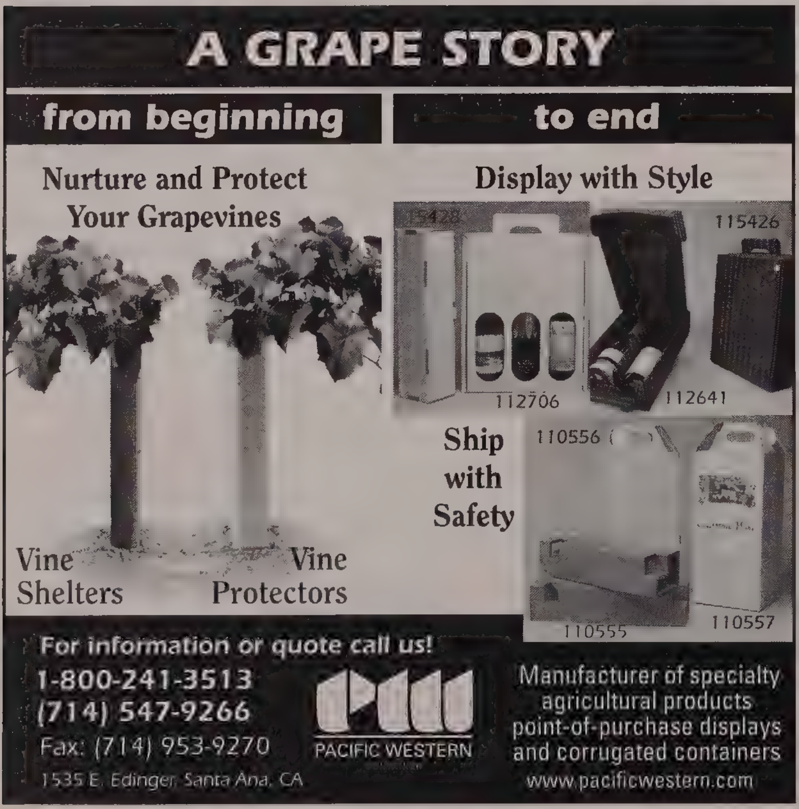
Conversely, an undercropped vine will have equally detrimental effects on quality. Cain's Howell, explains, "Where there is a big jungle of foliage and you don't see the fruit, the little bit of fruit that is buried in that foliage is going to taste like vegetables."

When a vine is in balance, further reducing yields may decrease quality, according to Tom Rochioli, co-owner of J. Rochioli Vineyards in Sonoma County. "In 1996, yields were off 40%, so the vines were out of balance. We pulled leaves and opened up the canopy to expose the fruit. Nonetheless, the 1996 wines had a slight herbal edge. The wines were not bad, but I went to the edge of where I wanted to be with regard to these flavors."

Herbal or vegetal flavors (asparagus, bell pepper) are characteristic of fruit that has been shaded by excessive foliage. Growers pull leaves and position shoots to improve the light environment around the clusters. A high leaf to fruit ratio, while good for ripening, causes shading which produces poor quality grapes.

Somewhere between overcropping and undercropping, the vine is in balance. The best quality from any vineyard is when there is a balance between foliage (canopy, leaf surface area, shoot length) and the amount of fruit. This balance creates more fruit in some sites and less in others, meaning that yield versus quality can only be determined in relation to the specific growing region and site. ■

Jordan Ross graduated from UC Davis with an Enology degree. He is currently involved in the wine trade in New York City.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EMERGING VARIETALS CONFERENCE, May 24-25

Are the best wines of the world made only from Cabernet Sauvignon and Chardonnay? While there are many fine wines made from these varietals, there are also numerous others that are quite extraordinary and not well known outside of their native range. On May 24 and 25, 1999, viticulturists, winemakers, and scholars from four countries will convene at the University of California at Davis for an "Emerging Varietals Conference."

The focus of the conference is on varietals that are selling well in the international wine marketplace as new technologies in winemaking blend with the best of the old grape growing traditions to make stunning wines. While the varietals such as Aglianico, Fiano, Periquita, and Tempranillo may not be household names, many of these varietals are centuries old, with unique flavors and origins not familiar to wine drinkers in the U.S. Even more interesting is the potential of some of these varietals as plant material for California vineyards.

"While Cabernet Sauvignon and Chardonnay are the standards of red and white wine quality, they both have their origins in cooler northern European climates that are quite different from California," says UC Extension viticulturist and conference coordinator Glenn McGourty. "The warm, sunny and dry climate of our state is much more similar to that of the Mediterranean rim, where fine wines have been made for centuries from other varietals with very different origins. The wine industry in these regions has been going through major changes in grapegrowing and winemaking practices. While they too have experimented with Chardonnay and Cabernet Sauvignon, they are returning to their native varietals, applying modern techniques, and getting exciting results."

Dr. Jim Wolpert, chairman of the Department of Viticulture & Enology will welcome the conference participants. "This is an important conference for the University of California for several reasons," says Dr. Wolpert.

"There will be considerable information in the conference that has never before been presented in English, which will add greatly to our viticultural knowledge. Second, it is our wish as an organization to foster better international relations in the wine world. This event presents people in the California wine industry with a chance to meet their foreign colleagues in a collegial atmosphere. We are happy to take a leadership role in giving California's wine industry options for future vineyards and wines."

Karen MacNeil-Fife, *Sunset* magazine wine columnist and director of wine education at the Culinary Institute of America's Napa Valley campus, will moderate the two-day event. Format of the conference will include speakers from Europe, wine tastings, and commentary by "discussants," who are knowledgeable American winemakers working with some of the emerging varietals in the U.S.

"Our hope is that, through the presentations, participants will get a sense of not only winemaking and style from the place of origin of these varietals, but also how the grapes are grown and how vineyard sites are selected," according to McGourty. "Presentation of viticultural information is a key component of this conference. You can find considerable commentary on the wines in trade magazines, but information on the grapegrowing is minimal."

The status of plant material both in Europe and the U.S. will be covered, along with rootstocks, site selection, training systems, and other cultural practices. Data from UC experimental plots in the North Coast and San Joaquin Valley will be presented.

"We have been looking at some of these varietals for almost six years and are beginning to draw some initial conclusions," McGourty explains. "By careful and systematic evaluations, we are giving the California wine industry information on options for future vineyards and wine programs. I'm very enthusiastic that many of these varietals do well in warm, sunny conditions and require far less manipulation in the winery to make high-quality, flavorful wines compared to varietals from the more northern wine regions of Europe."

Another important aspect of "Emerging Varietals" is selling these new products in the American marketplace. A panel discussion of winemakers and marketers, led by Bob Cappucino, will explore the challenges and rewards of introducing new wines to the wine trade. Cappucino is the director of the Consortizio Cal Italia, a group dedicated to supporting and promoting California wines made from Italian varietals. He has extensive sales and marketing experience with wines imported from Europe.

Finally, a tasting following the speaker presentations on May 24th will allow conference participants to taste individually from wines of merit not specifically covered in the conference, but offered by participating wineries.

"This is the first of a series of conferences and classes sponsored by University Extension (UNEX) on international varietals that are making an impact on the wine world," explains Dr. Jim Lapsley, UNEX director of agricultural programs. "In the coming year, we hope to also look at Sangiovese and varietals from Southern France, Spain, and Portugal. As the quality and notoriety of wines from these regions grows, interest in growing grapes and producing wines from these varietals in our country also grows."

Conference speakers were selected on the basis of their extensive knowledge and presentation skills. All are fluent in English. They include:

- Raül Bobet — technical director, Miguel Torres S.A., Vilafranca del Penedès, Catalonia, Spain — presenting information on and wines from the varietals Tempranillo, Monastrell, Garnacha, and Graciano.

Domingos Soares Franco — vice president of enology, Josè Maria da Fonseca Vinhos S.A., Azeitão, Portugal — presenting information on and wines from Touriga Naçional, Trincadeira, Touriga Francesca, and Periquita.

- Dr. Anna Schneider — researcher and ampelographer, Center for Grapevine Genetics, Turin, Italy — presenting information on and wines from Arneis, Cortese, Corvina, Tocai Friulano, Barbera, and Teroldego.
- Dr. Vittorino Novello — professor of viticulture, University of Bari, Apulia, Italy — presenting information on and wines from Negro Amaro, Nero D'Avola, Montepulciano, and Gaglliopo.
- Carlo Mastroberardino — vice president of marketing, Mastroberardino Winery, Atripalda, Italy — presenting information on and wines from Aglianico, Greco di Tufo, Fiano, Falanghina, and Peidirosso.

Conference discussants include: Greg Graziano, winemaker and owner, Monte Volpe Winery, Ukiah, CA; Dennis Horton, president, Horton Vineyards, Gordonsville, VA; Bob Cappucino, director, Consorzio Cal-Italia, Healdsburg, CA; and Randall Grahm, president, Bonny Doon Vineyards, Santa Cruz, CA.

Research presentations on California varietal trials include: Glenn McGourty, viticulture and plant science advisor, UCCE Mendocino and Lake counties, Ukiah, CA, and Paul Verdegaal, viticulture farm advisor, UCCE San Joaquin County, Stockton, CA.

The conference is a collaborative effort of UNEX, UC Cooperative Extension Mendocino and Lake County offices, and UC Davis Department of Enology & Viticulture.

The conference fee of $375 includes lectures and tastings, two lunches, and all written materials.

Location: University of California, Davis

For registration information: Contact UNEX at 800/752-0881 or online at http://universityextension.ucdavis.edu.

12th INTERNATIONAL ENOLOGY SYMPOSIUM, May 31-June 2

Location: Hotel Le Westin Mont-Royal, Montreal Canada

Organized by the International Association for Enology, Management, and Wine Marketing e.V.

Inquiries: Ann Dumont, tel: 514/496-6125, fax: 514/496-1515,
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OAK IN WINEMAKING SYMPOSIUM, June 28-29

Location: Reno Hilton, Reno, NV

International scientists, winemakers, and research enologists will share their latest results on oak chemistry, and many practical experiments, during the ASEV-sponsored Oak in Winemaking symposium preceding the society's annual meeting on June 30-July 2, 1999.

Monday's program will highlight recent research in oak and its effects on wine and brandy. Dr. Jean-Luis Puech of INRA, Montpelier, France, will present data on oak tannins and outline the Tonnellerie 2000 project in France. Pascal Chatonnet of the University of Bordeaux will present "Objective evaluation of the intensity and the homogeneity of barrel toasting: Application for quality assurance." Jim Swan, Tatlock & Thomson, Glasgow, Scotland, will address the "Influence of oak seasoning and toasting on wine quality." Dr. Johnathan R. Mosedale with INRA will focus on "Species and microclimate induced variation in oak components and their effect on wine." Andrew Waterhouse, UC Davis, will compare "Ellagitannins from seasoned and toasted oak and chestnut." Jeff McCord, E&J Gallo Winery, Modesto, CA, will present: "Toasting and oak flavor compounds."

The oral session will be complemented with a poster session, and the day will end with a tasting called "A comparison of U.S. oak forests," presented by Tonnellerie Francaise, Calistoga, CA.

Industry experience will be stressed on Tuesday with the California Enological Research Association Barrel Committee presenting its sensory methodology for evaluating the effect of oak in winemaking, organized by Barbara Lindblom. Several experiments will be presented which compare different barrels and barrel alternatives. Several winemakers will then discuss their experience with oak, and there will be a panel discussion on barrel alternatives.

Inquiries to: Andrew Waterhouse, ASEV, PO Box 1855, Davis, CA 95617; tel: 530/752-4777; fax: 530/752- 0382; email:alwaterhouse@ucdavis.edu.

VINE SPACING SYMPOSIUM, June 29

Location: Reno Hilton, Reno, NV

Experts from around the world will address the impacts of vine spacing, from economics to equipment in this Vine Spacing Symposium, which will precede ASEV's annual meeting on June 30-July 2, 1999.

Topics: "International perspective on vine spacing," Phil Freese, consultant, Winegro, Healdsburg, CA "Economic considerations on vine spacing decisions," Mike Fisher, Motto, Kryla & Fisher, St. Helena, CA. "Influence of vine spacing on fruit characteristics," Nick Dokoozlian, Viticulture/ Enology, Kearney Agricultural Station, CA. "Vine spacing effects on root development and water utilization," Eben Archer, Viticulture & Oenology, Stellenbosch University, South Africa. "Influence of vine spacing on Pinot Noir, Sonoma Coast," Greg Lafollette, Flowers Winery, Cazadero, CA. "Soil Considerations on vine spacing," Daniel Roberts, Kendall-Jackson. "Influence of vine spacing on Cabernet Sauvignon," Rich Arnold, Robert Mondavi Winery, Oakville, CA. "Influence of in-row spacing on Merlot in Carneros," Martin Mochizuki, Walsh Vineyard Management, Napa, CA. "Influence of vine spacing on Barbera in Central Valley, California," E&J Gallo Winery. "Equipment: Over-the-row compared to in-the-row choices," Rex Geitner, Spring Mountain Winery, St. Helena, CA.

Inquiries to: ASEV, PO Box 1855, Davis, CA 95617, tel: 530/753-3142.

50TH ANNUAL MEETING OF AMERICAN SOCIETY FOR ENOLOGY & VITICULTURE
Wednesday-Thursday, June 30-July 1

Location: Reno Hilton, Reno, NV.

Inquiries to: ASEV, tel: 530/753-3142; fax: 530/753-3318; email: society@asev.org.

OAK FROM FOREST TO GLASS: PRACTICAL MANAGEMENT OF OAK AND WINE
Wednesday-Friday, July 14-16

Location: St. Louis, Missouri

International meeting will bring together suppliers, winemakers, and research personnel to discuss the practical applications of oak in winemaking. Annual Meeting of the American Society of Enology & Viticulture, Eastern

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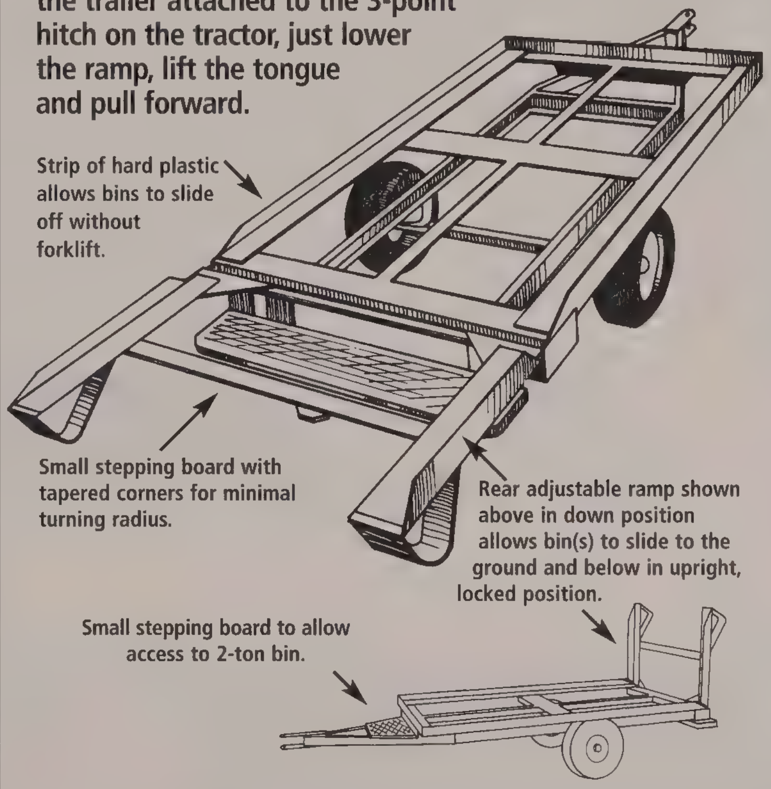
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5th International Symposium on COOL CLIMATE VITICULTURE & ENOLOGY
January 16-20, 2000

Location: Melbourne, Australia

This will be first time the International Symposium on Cool Climate Viticulture & Enology will be held in Australia. The Melbourne Symposium is being jointly organized by the Victorian Wine Industry Association, and Australian Society of Viticulture & Oenology, with assistance of the New Zealand Society of Viticulture & Oenology.

Many pre- and post-Symposium tours of the cool climate production zones of Victoria, New South Wales, South Australia, Western Australia, Tasmania, and New Zealand are planned on the eve of Vintage 2000.

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Gallo brands continued from page 47.

Marcelina

Gallo has been buying grapes in Napa Valley for a long time. In the past, Napa fruit was as much as 35,000 tons, about half of Gallo's North Coast production. Today, much less fruit is purchased from Napa because of the development of Gallo vineyards in Sonoma County and elsewhere.

Magnasco explains that 87% of the fruit for Marcelina Chardonnay comes mostly from Yountville. "It's not Carneros, but the fruit has some of the attributes associated with it." The remaining 13% is a blend of 10% Dry Creek Valley and 3% Russian River Valley sources.

Marcelina Chardonnay evolved because the fruit was unique. It became the sister wine to some special lots of 1993 Napa Valley Cabernet Sauvignon that were held back because they were distinctive and therefore were not blended into another wine.

Labeled Napa Valley, 1996 Marcelina Chardonnay features concentrated fruit flavors with lots of richness, complemented by 100% new French oak. Vanilla and caramel hints over tropical fruit tones make this wine, with generous body, finish in grand style. About 10,000 cases were bottled, and the wine retails nationally for $20.

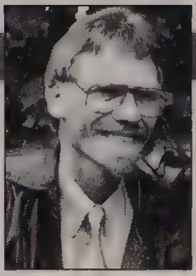
When this fruit came to the winery, it had a ripe character, Monticelli notes. "The grapes tasted almost like honey. In 1996, the alcohol was over 14%." Thoukis adds, "When the winemakers went into the vineyards, they believed that the grapes needed more flavor, so we let them hang for flavor development."

Like some other brands, the wine was barrel fermented in 100% new French oak, but barrels for Marcelina were medium toast. Bottling stats for this dry wine are 0.58 TA and 3.41 pH.

Regional

Gallo's expansion in northern California and on the Central Coast, multiple grape origins, and diversity necessitated the creation of new brands. While *PWV*'s focus was Chardonnay in four new brands, Gallo continues to expand its horizons by showcasing these regions of origin with other varietals in these brands as well. ■

SMART VITICULTURE



by Dr. Richard Smart

VINEYARD QUALITY ASSURANCE, *Why not?*

This column begins a two-part discussion on the contribution viticulturists make to wine quality. The next column has the provocative title: "Viticulturists, the real winemakers!" Let's begin by examining a major weakness in the work of most viticulturists; this is an area where they can learn from their enologist colleagues. Enologists use quality assurance procedures widely, viticulturists do not. It's my hope that this column will inspire viticulturists to improve their performance.

How is quality assurance done in the vineyard?

What are quality assurance procedures in the vineyard and why do them? I am proposing that detailed records be collected on a sample number of vines in each vineyard block on an annual basis, and that these records be used as a guide for managing the block as a whole. The underlying principles and the procedures are introduced in my book *Sunlight into Wine*, which so far as I know, is the only viticulture book to endorse using quality assurance in the vineyard.

When are measurements made? Measurements should be done at least two times in a season, at winter pruning and at summer harvest. Most managers who use the system find it helpful to also do measurements around bloom in spring.

What sort of measurements are made? In winter, we count the number of shoots (more strictly canes) per vine, which we will term **C**; then we prune the vines and measure pruning weight, **P,** and count the buds, **B**. At harvest we count the bunches (clusters), **N,** and weigh them to obtain yield per vine, **Y**. The bloom measurement is normally just a count of clusters.

How many vines do we monitor? Provided the block is uniform, then I normally suggest 30 to 50 vines, say for a minimum of 10 acres. If the block is distinctly non-uniform — because of soil variation, for example, which is the normal reason — then you will need to use perhaps 30 vines for each distinctly different sub-region.

The same monitor vines are used for all measurements through the life of the vineyard. I suggest they be chosen in groups of four vines and that these groups be scattered throughout the vineyard. Each vine is given a unique identifying number and is tagged. Durable plastic tags, which are sold in numbered series for cattle ears make good markers. These can be wired directly onto the vine. To make the vines easy to find, paint the lower trunk and the accompanying stakes or posts. Marking the end assembly on rows with monitor vines also makes locating them easier.

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The data can be entered into a spreadsheet, which makes all manipulations easy.

Using the measurements

We can use the measurements to calculate several values. First, we can calculate mean cane weight: **$MCW = P/C$**. We can also calculate mean bunch weight: **$MBW = Y/N$**. Vine balance is calculated as the dimensionless ratio of yield to pruning weight: **$BALANCE = Y/P$**, and pruning level is the number of buds per unit pruning weight: **$PRUNING = B/P$**. Vine **VIGOR** can be estimated as pruning weight, **P**, per unit length of row, or per unit length of canopy if canopy division has been used. For vine spacing **D** and for undivided canopies, **$VIGOR = P/D$**, and for divided canopies, **$VIGOR = P/2D$**.

Measurement leads to better management

How can this data be used? They can be used in many, many ways.

How many buds should be left at winter pruning? The *Two Golden Rules of Viticulture*, as described earlier (*PWV*, Sept-Oct 1993), answer this question. In general, we should prune to leave 12 to 16 buds per pound of pruning weight, as indicated by the first Golden Rule. This will create ***balanced*** vines. Having measured pruning weights on monitor vines beforehand, the viticulturist can make the best decision about how many buds to leave for the whole block.

Are your vines balanced? A yield to pruning weight ratio of around 4:1 to 6:1 indicates a well-balanced vine. Vineyards with excessive vigor return values of 2:1 or less, and so-called "over-cropped" vineyards can have **BALANCE** values of more than 12:1. **MEAN CANE WEIGHT** is also a good indicator of balance, with ideal values around 40 grams per cane.

Different trellis systems are best suited to different levels of vigor, so calculating **VIGOR** and **BALANCE** may lead you to consider changing your trellis system. Vigor values of more than 0.5 lb per foot indicate the need to change trellising, (see *PWV* July/August 1997).

Do the vines have too much vigor? Should irrigation practices or fertilizer use be changed? Again, calculate **VIGOR** and **MCW** or plot them against time to see how they vary from year to year. Marty Hedlund of Dehlinger Vineyard (Sebastopol, CA) used such an approach to come to grips with soil variation in his vineyard (see *PWV*, Nov/Dec 1995).

What will your vineyard yield next year? By making bloom counts of shoots and bunches, and armed with knowledge of previous year's **MBW**, you can make an early yield estimate, several months before harvest. You may choose to estimate **MBW** after you have observed how the vines set in the current season. Likely you and your winery will benefit from this information!

Conclusion

Quality assurance also includes other aspects such as petiole nutrient and soil moisture monitoring, canopy scoring, and of course, fruit sampling to determine harvest date. However, the measurements I have presented here are key for monitoring vineyard performance.

The cost of such quality assurance is not high. The vines have to be pruned and harvested anyway, and counting and recording require little time. Of course, if you are mechanically harvesting, you need to send a hand crew through the day before to measure the sample vines.

My top clients around the world use these systems, and to a person, they claim major benefits in vineyard performance and productivity. Why not try quality assurance yourself? ■

Dr. Richard Smart, "the flying vine-doctor" is an international viticultural consultant. Contact him in Australia by fax at 011-612-6584-0121, or by email: vinedoctor@smartvit.com.au. Visit his home page at http://www.smartvit.com.au He visits America frequently and can be contacted at Vinquiry in Windsor, CA, tel: 707/838-6312.

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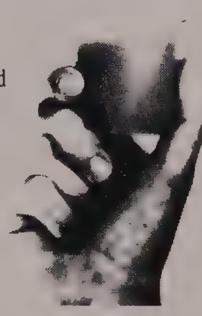

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WINERY WATER & WASTE

by D.R. Storm, PhD, P.E.

BEATING RUST AND THE HARLEY-DAVIDSON CONNECTION

Newly formulated gasolines have been concocted to help meet the federal EPA Clean Air Act Amendments. There have been several steps forward in accomplishing the air quality goals that have been followed by a retreat on gasoline additive issues like MBTE (methylbutyltertiaryether) and additional oxygenation during winter months to allow engines to more fully combust fuel during lower winter temperatures.*

If you recall the chemistry of steel corrosion (the dynamics of rust formation) from high school chemistry, one of the key elements in the formation of rust is oxygen. The iron molecule (Fe^{++}) readily attaches several oxygen molecules to form Fe_2O_3 or ferric oxide, more commonly known as rust. As a result, the additional oxygen added to gasoline creates more aggressive rusting potential in fuel tanks constructed of ferrous (iron/steel) metals. Any part of the tank interior that is exposed, above the gasoline level, is very vulnerable to rusting. Changes in temperature cause condensation of water vapor in the space above the free surface of the fuel, which contributes to the aggressive corrosion of unprotected steel.

At our winery, a pre-polyethylene fuel tank on an otherwise functional lawn mower and the bare ferrous metal tank on a small outboard motor, both became badly corroded due to this phenomenon. Replacement tanks were not available for either device, which clearly made a strong argument that the machines should be donated to the local thrift shop or the solid-waste landfill.

This unnecessary loss of the two motor-driven mechanisms was prevented by the discovery of a three- part gas tank liner and rejuvenator often stocked, apparently, in motorcycle sales and repair shops. The results were excellent, and the lawn mower and outboard motor are now functioning as if they will last forever. The product called "Kreem" is manufactured by Kreem Products, PO Box 399, Somis, CA 93066 (805/386-4470) and sold in many retail motorcycle shops and available from J.C. Whitney (312/431-6000).

Wineries often have a stable full of some of the most under-utilized equipment in the industrial world and need to extract the last measure of service life from all their machinery. Pass this fuel tank life-saving tip on to winery maintenance supervisors, thus preventing the early death of vintage chain saws, weed eaters, mowers, tractors, ATVs, portable electric generators, and pressure washers.

Concrete: Construction material super-star

Sorting out the nomenclature

Architects, engineers, and builders have made concrete their principal construction material since its development in England nearly 175 years ago. The terms "cement" and "concrete" are often incorrectly used interchangeably by lay persons. Cement is just one ingredient in concrete, though from a strength and durability standpoint, it is the most important element and the "glue" in the recipe.

To further compound the widespread use of incorrect nomenclature, the construction trade workers responsible for screeding (leveling), troweling, and otherwise finishing poured concrete are called "cement finishers." Add to this confusion the name usually ascribed to the portable gas engine-driven devices used to concoct small batches of concrete or masonry mortar, "the cement mixer." Semantically speaking, through improper but continued use, the term cement has evolved to be almost a synonym for concrete. (In the period musical *My Fair Lady,* Henry Higgins would have had a dreadful time explaining to Eliza, the cement-concrete word usage conflict.)

Wineries and Concrete

Whether you're planning a foundation slab for a piece of new winery equipment or a base for additional stainless steel storage tanks, give some serious thought to the choice of the concrete mix and its necessary steel reinforcement. Medium to large wineries often have in-house skills to form and pour small concrete structures. While the structural factor of safety can often be made acceptable by "over-building" an equipment pad, for example, retaining a design professional to provide a safe and functional concrete structure can be money well spent.

If the latter option is exercised, winery management and maintenance personnel should have sufficient knowledge of concrete to provide the designer with their expectations for the non-structural performance for the concrete. For example, no shrinkage cracks in the finished work to create sanitation problems; a smooth, troweled finish for ease in cleaning, but rough enough to prevent slipping by cellar workers; acid resistance; and/or durable coatings with anti-bacterial and fungi add-mixtures.

What is concrete?

Joseph Aspdin, who in 1824 stumbled upon the process for producing cement in his kitchen, would be impressed by the types of concrete (eight are currently available) and chemical admixtures to control among other things — time of set, workability, and freeze protection. Cement, aggregate (a.k.a.: size-graded crushed rock or stream gravels plus sand), and water are combined in various quantities to achieve a *design strength* for the intended end-use.

Generally speaking, the more cement that is used in the concrete mix, the greater the compressive strength. The mixes are often referred to as "5-sack" or five sacks per cubic yard (*i.e.* 90 lbs. of cement per sack). There is also a factor known as water-cement ratio, which must be balanced with consistency (ability to flow or slump), so that the concrete can be delivered, conveyed, and otherwise "worked" without loss of strength.

If an engineer specifies an end-product compressive strength of, say, 3,000 pounds per square inch at 28 days, the concrete supplier is responsible for achieving that strength with his mix protocol. [Please note that the tensile strength of concrete has not entered the discussion principally because it has insignificant strength in tension. Reinforcing steel embedded in the concrete in the correct amount, provides the concrete with tensile strength.] The compressive strength is verified through sampling of the concrete that arrives at the job site. After proper curing, often in a wet-steam environment, for seven days (the initial concrete set time-lapse) and 28 days, when the concrete theoretically reaches its design compressive strength, the sample cylinders are broken in a materials laboratory testing machine. These data are provided to the general contractor and to the design architect or engineer.

---

* *MBTE has been found to be polluting the surfacewater and groundwater resources of the U.S.*

Concrete curing

Surprisingly, concrete can cure under water, as it supplies its own heat of hydration. (The chemical reaction that takes place when the water that was taken away from the limestone in the kilning process phase of cement production, is again added to create the concrete mix.) If the moisture and heat energy from re-hydration in the poured concrete are allowed to escape to the surface too rapidly, shrinkage of the drying mass will occur, producing unwanted cracks and impairing the design strength.

Forty to 50 years ago, the greatest carpet recyclers were contractors, who needed an inexpensive medium that would hold applied moisture. They used wet carpets to cover the "green" concrete, which would moderate the rate of curing and moisture loss through the surface. Chemical curing compounds are now available that restrict the rate of moisture loss. During hot summer temperatures, the curing step becomes even more critical.

In colder climates, concrete ingredients are often preheated, so that the re-hydration process can occur, even if the ambient air temperature is near or below freezing. For large projects with large volume, nearly continuous concrete pours, low-pressure, inflatable structures are erected to allow artificial heating of the near-project environment. This technique permits concrete work to proceed in very cold regions and still maintain high-quality, finished concrete elements.

Concrete delivery systems

At approximately 150 lbs. per cubic foot, concrete movement and placement can be difficult. Much of what was historically the backbreaking labor of concrete placement has been replaced in the last 15 years with large pieces of equipment called concrete pumps. These pumps and their associated hydraulic booms and hoses, permit delivery of concrete to heights approaching 15 stories (171 feet) at flow rates of 200 cubic yards per hour.

Pneumatic concrete conveyance systems can also be used for lining tunnels (wine caves) and for creating impervious pond and canal linings.

Other facets of the world of concrete

Transit-mix trucks (*a.k.a.*: ready-mix trucks) receive measured amounts of aggregate, cement, and water, which are blended and mixed in the truck's mixing drum for a ***specified period of time***. The variables of distance from concrete batch-plant site to job site, ambient temperature, and type of pour to be made — walls, flat slabs, beams, girders, or pavement — must all be factored into the time-of-mix equation.

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For example, when the transit-mix truck arrives, if the operator is observed adding water to the mix drum from the truck-mounted water tank and hose because of an excessive wait at the job site or traffic delays enroute that may have permitted the concrete to go beyond its ideal mix period, setting may have begun to occur in the truck. The driver's supplemental water will delay the set, but it will also unbalance the water-cement ratio previously programmed at the batch site by the concrete supplier. A sample of that batch should definitely be taken for strength testing or the load should be rejected.

If the winery staff is responsible for inspecting the concrete work, an alert, trained, and forewarned employee can help prevent a less than job-perfect performance by the contractor and his concrete supplier.

An excellent reference for winery staff, who are given the responsibility for inspection of concrete work, is Chapter 26 of the Uniform Building Code 1997 Edition entitled *Concrete*. While the code may not make entertaining reading, the content is complete for novice and old hand alike. ■

David Storm is a consulting civil/sanitary engineer specializing in winery utility systems and the owner of Winters Winery, Winters, CA. He is the author of the reference book, Winery Utility Systems: Planning, Design & Operation, *Chapman and Hall, NY, December 1996.*

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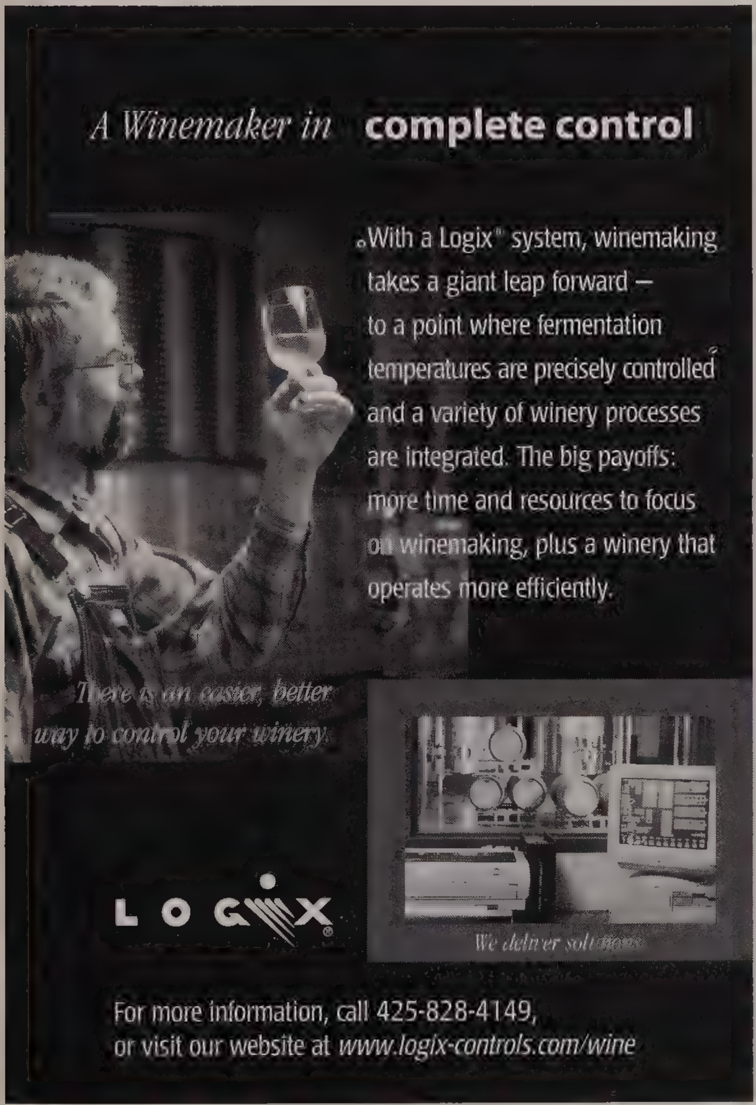

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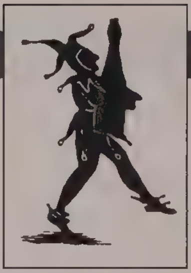

by Jake lorenzo

Not for sale

A wise man learns from the mistakes of others. A smart man learns from his own mistakes, and some damn fools just won't learn. I'm not sure where that puts Jake Lorenzo.

Remember Jake Lorenzo's concept of voting with your dollars? I thought that was a good idea. Spending money locally, supporting those people whose vision excites you, is a wonderful way of assuring that they succeed. If they succeed, they remain in your life, which makes your life better.

I now have a corollary of voting with your dollars. Jake Lorenzo says that we have to find like-minded people and introduce ourselves. That way we create a support network. We need to let people know when and where we find art, intelligence, and compassion, so our friends can take a look for themselves.

Last year I was in New Orleans. We went to see a Zephyr game at the new ballpark. The Zephyrs are a AAA baseball club currently owned by the Houston Astros. The park is gorgeous, state of the art, with good hot dogs. Before each game, a group of Little Leaguers takes the field with the baseball players. Each starting player stands with a kid on either side of him, and they all have their caps over their hearts while the "Star Spangled Banner" plays.

After the game, every kid in the park is invited to run the bases. Hundreds of children line up in the stands and pour out to first base. They run like hell around the bases and all the way home. As Jake Lorenzo watched the unending line of children scurry around the bases, I thought, "This is great. This is what baseball should be. This is what it was for me when I was a kid."

Then I look at Mike Piazza, Kevin Brown, Randy Johnson, and Roger Clemens. Give me a break. You should be ashamed of yourselves.

A friend of mine is a record producer. Last year he made a record with Johnny Adams. Johnny Adams is an incredible singer. His voice is rich and pure. He can hold, sustain, twist, and play with individual notes like no one else I've ever heard. Johnny Adams has made dozens of albums. My friend has produced eight or ten of them.

But in 1998 they made *Man of My Word*. It's Johnny's last album. He had cancer when he made the record. Everyone knew this would be his last album. They created an album so driven by talent and simple emotion that it makes you cry. Every note, every phrase, every guitar riff and horn chorus is perfect. Johnny did what he does. The "Tan Canary" sang his whole life in just under an hour. Jake Lorenzo says it's art, pure and simple.

Man of My Word won't sell 10,000 units. Then I look at the *Titanic* soundtrack. Give me a break. You should be ashamed of yourselves.

Walter Mosley is a great writer. Jake Lorenzo knows his detectives, and Mosley's Easy Rawlins is a good one.

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Sometime, somewhere, Walter Mosley wrote a script. Somehow, someway, it got made into a movie. It's not a perfect movie, but it takes us into a world that we don't often get to see. It introduces a black man, Lawrence Fishburne, trying to live a moral life and shows how he deals with an older mentor and a young boy. In short, he's a wise man, a smart man, and a damn fool, all rolled into one. No wonder Jake Lorenzo likes him. The picture has the misleading, miserable title of *Always Outmanned, Always Outgunned.*

I marvel that someone got this movie made. Then I look at *Armageddon*. More than $200 million earned for that? Give me a break. You should be ashamed of yourselves.

Jake Lorenzo sits in a comfortable, small house in Sonoma. Two ex-winemakers sit at the table with him. They are the founders of Underground Winemakers, a non-commercial organization of winemakers producing wines that are not for sale. The woman had worked at several high-profile wineries, done some consulting, and then got out. "The business ate me up," she said. "I became a winemaker because it gave me a chance to test myself against Mother Nature. I loved that part, but when the emphasis changed from making the finest wine to making the most money, I lost my desire.

"At first I thought I didn't want to make wine anymore. Then I realized I ***had*** to make wine, I just didn't want to be in business. I kept meeting other winemakers who had gone through the same process, so we formed a support group, but what we really do is get together to drink each other's wines."

She poured two of her wines. Exquisite. The first was a blend of Sauvignon Blanc and Semillon. Crisp, dry, and steely like a Graves. The second was Chardonnay, but tasted of Chablis, full of crisp mineral complexity, none of that commercial buttery malolactic syrup for her. She found these wonderful grapes in the Santa Lucia Highlands of Monterey. She makes one 60-gallon barrel of each wine in her home. The wine is not for sale, but she gave me a few bottles.

The man makes Pinot Noir. It's an obsession. "I was a professional winemaker for almost 20 years. I've got to say I loved every minute of it. But I learned an important lesson being a winemaker. Every attempt to achieve something is gained at the cost of something else. To gain fruitiness, we must sacrifice complexity. To gain buttery texture, we must sacrifice tart, crispness. You can't have it both ways. You must choose.

"It seems that everyone chose money. It's like a formula: grow more grapes per acre, make the wines softer and more ready to drink, use newer oak barrels, continually make more wine, and raise the prices annually. I don't think you can choose profits and maintain the love and joy of winemaking. So I made a choice. I chose to make a small amount of wine here in my home. It fulfills my need to be a winemaker, to challenge Mother Nature, and it fills my cellar with delicious wine that I can't afford to buy on the open market."

We tasted four different Pinot Noirs from four different vineyards. Each was distinctive, complex, extracted, aromatic

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with a wonderful velveteen texture in the mouth. Those four wines were some of the finest California Pinot Noirs Jake Lorenzo had ever tasted. The man gave me a few bottles.

My editor said, "Give me a break. You're going to write about wines that no one can buy? What's the point of that?"

Jake Lorenzo thought a minute, then I said, "Magazines write about rich people starting up extravagant wineries all the time. Those people charge fortunes for their wines, and only other rich people can afford to buy them. It seems to me that winemakers working from a genuine love of the winemaking process, who produce tiny amounts of exquisite wines, and then give them away to their friends are a valid story. What makes overpriced wines sold to your wealthy friends a better story than fantastic wines given to your friends for free? What makes commerce a better story than friendship?"

"Maybe you're right," he said. "We'll run the story, but do you think you could get me a couple bottles of that Pinot Noir? I'd like a few of the whites too."

"I told you," answers Jake, "the wines aren't for sale."

"C'mon, I'll even pay up to $50 a bottle, if I have to."

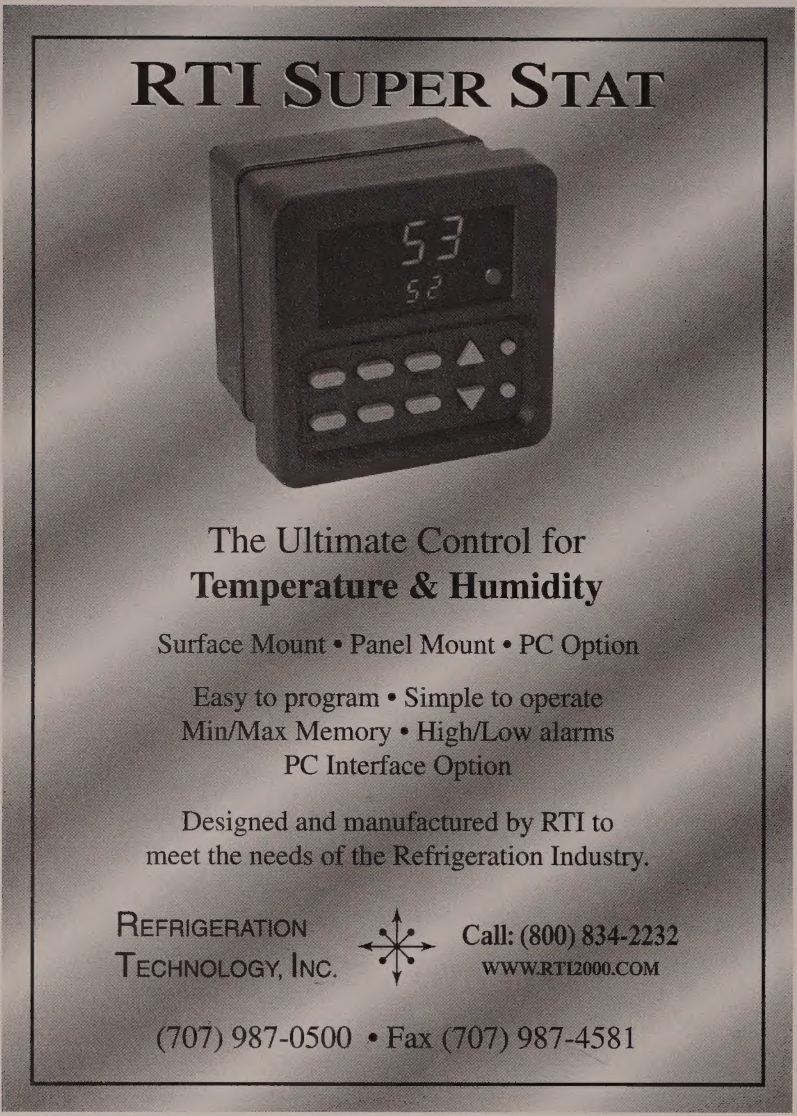
"You're money's no good here," I explain, "These wines are not for sale, at any price."

"All right, if they're as good as you say, I'll pay up to $100 per bottle."

"They're still not for sale," smiles Jake, "but I would have been a damn fool to let you have them for $50, wouldn't I?"

"Aw, c'mon Jake. It's your old pal and editor talking here…"

Like I said, some damn fools just won't learn." ■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Joseph Ciatti Company	51	415/388-8301	415/388-0528	Joseph Ciatti
Comlease USA	20	800/767-0001	209/252-6200	Bill Volpa
Cork Associates	57	707/224-6000	707/224-7616	Jack Squires
Cork Supply USA	72	707/746-0353	707/746-7471	Justin Davis
Corey Delta	26	707/747-7500	707/745-5619	Mark Ricci
Criveller Company	53	905/357-2930	905/357-2930	Bruno Criveller
Cuesta Equipment	18	805/544-2540	805/544-2627	Mike Jacinth
Duarte Nursery	25	800/GRAFTED	209/531-0352	John Duarte
ENCORE!	46	510/234-5670	510/234-0433	Peter Heylin
Euro-Machines, Inc.	6, 47	540/825-5700	707/976-8802	Matt Eiser
Food, Wine, & Spirit Grp.	38	707/255-2031	707/253-8234	C. Foppiano
Gordon Graphics	50	415/883-0455	415/883-5124	G. Lindstrom
Government Liaison	42	800/642-6564	703/525-8451	James Hurson
Gripple	22	800/654-0609	800/654-0689	Dawn Shad
Hansel Leasing	40	707/544-2822	707/544-7801	Jim Taylor
Innerstave	59	707/996-8781	707/996-1157	Bob Rogers
Juvenal Direct	8, 24	707/254-2000	707/642-2288	R. Moeckly
Kimco Mfg., Inc.	66	800/356-9641	209/277-9358	Jerry Welker
KLR Machines	35	707/823-2883	707/823-6954	S. Valeriote
Lake Co. Winegrape Com.	44	707/995-3421	707/995-3618	S. Gunier
Lorane Grapevines	67	800/884-4441	541/942-9867	Tom Lodge
Lodi-Woodbridge Comm.	15,17,19,21	209/367-4727	209/367-0737	M. Chandler
Logix Refrig. Controls	67	206/828-4149	206/828-9682	Jim Conant
Mendocino Cooperage	71	415/457-3955	415/457-0304	Jim Boswell
Mill Creek Mfg.	9	717/656-3050	717/656-7828	Joe Glick
NAJ Enterprises	10	888/925-4748	202/973-8127	N. Najarian
Napa Fermentation	62	707/255-6372	707/255-6462	Pat Watkins
Nat'l Bank of Redwoods	50	707/573-4827	NA	Brent Cannon
Pacific Coast Farm Credit	39	800/800-4865	707/545-9400	Terry Lindley
Pacific Western Container	58	800/241-3513	714/953-927	NA
RLS Equipment Co.	56	609/965-0074	609/965-2509	B. Stollenwerk
Redwood Equipment	64	707/586-1790	707/586-1745	Bill Sauber
Refrigeration Technology	70	800/834-2232	NA	G. Marks
Craig Root	35	707/963-7589	707/963-6009	C. Root
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Scott Labs	63	707/765-6666	707/765-6674	Steve Doherty
Sonoma Grapevines	53	707/542-5510	707/542-4801	Rich Kunde
StaVin	30	415/331-7849	415/331-0516	Alan Sullivan
Storm Engineering	44	916/795-3506	916/795-1119	David Storm
Sunridge Nursery	3	805/858-2237	805/366-4251	Terry Stollar
Teel Plastics/Snap n' Grow	52	888/476-9882	608/355-3088	Chris Siems
Tonnellerie Boutes	20	707/542-1158	707/544-7684	Ken Seymour
Tonnellerie Francaise	5	707/942-9301	707/942-5037	Duane Wall
Tonnellerie Radoux	34	707/588-9144	707/588-8547	M.Gaxiewicz
Tonnellerie Saury	69	707/963-3666	707/963-8228	Bayard Fox
Valley Pipe & Supply	67	209/233-0321	209/233-1713	Mitch Long
Vestra Resources, Inc.	62	530/223-2585	530/223-1145	J. Carothers
Vineyard Water	42	805/995-0587	805/995-0587	L. Wheeler
Vinifera Nursery	15	800/648-1681	707/773-0665	Dave Nelson
Vinquiry	52	707/433-8869	707/433-2927	M.A. Graff
Vintage Nurseries	28	800/499-9019	805/758-4999	Jeff Sanders
Weed Badger	55	800/437-3392	701/778-7501	J. Anderson
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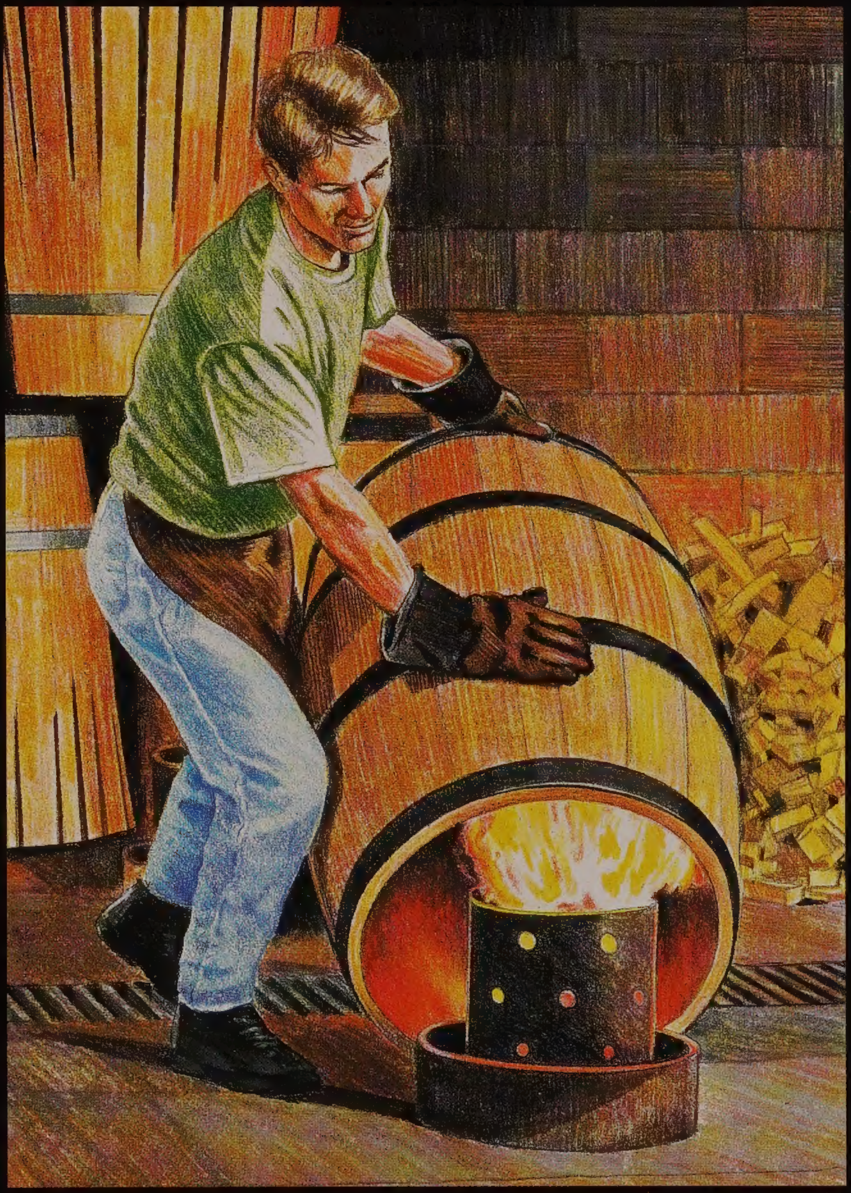
Wine Appreciation Guild	42	800/231-9463	415/866-3513	E. Mackey
World Cooperage	2, 44	417/588-4151	417/588-3344	Ed Larmie

One Barrel at a Time



Mendocino Cooperage

Barrels produced by our master craftsmen have an impeccable reputation for excellence, consistency and value.

Staves are hand selected to ensure wood grains are uniform. Barrels are shaped by forming the staves over an oak fire. After the hoops are in place, the new barrels continue their slow toast to give each barrel its classic oak flavor profile.

Barrels crafted with pride, one-at-a-time, by the coopers of Mendocino.

MENDOCINO COOPERAGE

Sales Agent:
The Boswell Company
Phone: (415) 457-3955
Fax: (415) 457-0304

Mendocino Cooperage:
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